

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
Tactical 2	Air Vehicle	Airframe	Tactical Tier 2 UAV shall have the capability to be launched from a submarine.	Red
UCAV-N	Air Vehicle	Airframe	UCAV-N shall support payloads that provide the fire control solution of moving land forces for 50 nm beyond the range of SA XX surface to air missiles.	Yellow
UCAV-N	Air Vehicle	Airframe	UCAV-N shall support payloads to perform identification of moving land forces for 50 nm beyond the range of SA XX surface to air missiles.	Yellow
UCAV-N	Air Vehicle	Airframe	UCAV-N shall support payloads to perform reconnaissance of moving land forces for 50 nm beyond the range of SA XX surface to air missiles.	Yellow
UCAV-N	Air Vehicle	Airframe	The UCAV-N shall be capable of carrying the following payloads in multiple combinations: Laser designator, EO/IR Sensor, NBC sensor, Anti-Radiation Missiles, Smal Diameter Bomb (SDB) Precision Guided Munitions (PGMs), Laser Guided Bombs (LGBs)	Yellow
UCAV-N	Air Vehicle	Powerplant	UCAV-N shall be able to fly the following profile without refueling: * Takeoff , Rendezvous and orbit at 30Kft for 30 minutes and Max endurance, Ingress at 30Kft for 30 minutes and max range profile, descend to 500ft AGL for 3.5 hours at a minimum of M=0.9, climb to 30Kft and egress for 30 minutes at max range profile, Loiter for 1 hour at max endurance, recover [Supports a double cycle mission supporting low level reconnaissance below the cloud level while taking off before and landing after the manned aircraft.]	Red
UCAV-N	Air Vehicle	Powerplant	The UCAV-N shall be capable of 14 hour CV-based endurance while operating an EO/IR, multi-mode radar and ESM payload and carrying two JDAM class weapons.	Red
UCAV-N	Air Vehicle	Powerplant	The UCAV-N shall be capable of flying the following profile while carrying EO/IR, laser designator, multi-mode radar and two laser guided bombs: Takeoff, Climb to best cruise altitude, Fly maximum range profile for 1,000 nm, Fly maximum endurance profile for 6 hours, Fly maximum range profile for 1,000 nm, Loiter overhead ship for 1 hour at max endurance, Recover [Time on station needs some confirmation. 6 hours allows 4 missions a day and makes possible performing the 4 missions with 2 vehicles. It appears to match the ballpark of endurance needed to do the 12-14 hour overnight loiter mission.]	Red
UCAV-N	Air Vehicle	Powerplant	The UCAV-N shall be capable of receiving fuel in-flight from the F-18E/F tanker.	Yellow
UCAV-N	Automatic Control System	Auto Takeoff & Landing	UCAV-N shall be able to operate in conjunction with manned ashore operations without disrupting the operation of the manned vehicles.	Red
Tactical 2	Automatic Control System	Auto Takeoff & Landing	Tactical Tier 2 Air Vehicle shall be capable to both launch and land on amphibious ship and unprepared shore sites.	Yellow
Tactical 3	Automatic Control System	Auto Takeoff & Landing	Tactical Tier 3 UAV shall be capable of landing on a small surface combatant.	Yellow
Tactical 3	Automatic Control System	Auto Takeoff & Landing	Tactical Tier 3 Air Vehicle shall be capable of both launching and landing on amphibious ship and unprepared shore sites.	Yellow
HALE	Automatic Control System	Automatic Target Recognition	The HALE EO/IR payload shall be capable of templating/ATR techniques to support the identification of surface combatants, surfaced submarines and commercial vessels in blue water and littorals at ranges of XXX nm beyond the threat envelop of an SA XX and SAN XX surface to air missile which is a total of XXX nm.	Red
HALE	Automatic Control System	Automatic Target Recognition	The HALE EO-IR sensors shall be capable of monitoring large scale land force movements at a range of 50 nm beyond SA-XX surface to air missile range or a total of XXXnm. The EO-IR sensor payload shall have the capability of both recording and processing the movement of targets, and to be capable of identifying, through spectral, temporal, and/or spatial filtering algorithms, the presence of enemy activity and the degree of hostile intent.	Red
HALE	Automatic Control System	Automatic Target Recognition	The HALE UAVIRST system shall provide classification on 20 TBMs within the optical line of sight in a defined threat sector of 180 degrees.	Red
HALE	Automatic Control System	Automatic Target Recognition	The HALE UAVIRST shall be capable of classification of the threat based upon parameters that may include boost characteristics, IR signature, kinematics, etc.	Red

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
HALE	Automatic Control System	Automatic Target Recognition	The HALE MMR shall perform the following functions as part of the identification of fixed or mobile TBM launchers: *Accept cues from IRST or external sources and generate interval strip or spot map (based on error estimate for launch point). *Automatically form area of interest for area surrounding launch point estimate. *Track moving target inside AOI with track continuity of XX%. *X m MTIm with identification tags for assessed tracks. *Cueing of all other onboard sensors. All of these functions shall be performed at a range greater than SA XX surface to air missile range or a total of XXX nm.	Red
HALE	Automatic Control System	Automatic Target Recognition	The HALE EO-IR subsystem shall require minimum inputs and control by the payload operator and mission requirements shall be pre-programmable.	Yellow
HALE	Automatic Control System	Automatic Target Recognition	The HALE EO-IR payload shall have sufficient resolution (NIIRS X) for supporting detection, tracking and cueing of onboard and offboard sensors for surface combatants, surfaced submarines, and small commercial vessels in blue water and the littorals. The system resolution shall be supported at ranges of XX nm beyond the threat envelope of an SA XX and SAN XX surface to air missiles.	Yellow
HALE	Automatic Control System	Automatic Target Recognition	The HALE MMR shall report all classification/identification decisions with confidence to the communication system for dissemination through the data link architecture. The MMR shall accept cues from offboard sources and shall provide the classification and identities associated with these cues. The system shall correlate and tag any MMR data with offboard track data to facilitate offboard ID decisions. [Range will be probably be driven by defended target requirements. Analysis required.]	Yellow
HALE	Automatic Control System	Automatic Target Recognition	The HALE MMR shall have automated modes capable of identifying surfaced submarines in the littoral environment at a range greater than SAN XX or SA XX surface to air missile range or a total of XXX nm.	Yellow
HALE	Automatic Control System	Automatic Target Recognition	The HALE MMR shall have resolution capable of identifying surface combatants, surfaced submarines, cargo vessels and coastal vessels in the littoral environment at a range greater than SAN XX or SA XX surface to air missile range or a total of XXX nm.	Yellow
UCAV-N	Automatic Control System	Automatic Target Recognition	The UCAV-N UAV MMR shall generate internal cues, based upon surface search mode data, for the generation of high resolution spot map and/or MTIm to facilitate the identification process at 50 nm beyond the threat envelope for an SA XX surface to air missile. The resolution of the SAR imagery shall be X meters. [The range based upon 50 nm beyond the maximum range of SA XX or SAN XX against UCAV-N to allow it to function as a gap fill land surveillance system.]	Yellow
Tactical 3	Automatic Control System	Automatic Targeting	The Tactical Tier 3 EO-IR subsystem shall target fixed and moving vehicles to within 7 m CEP in an urban environment at ranges of XX nm for maximum vehicle speeds up to 60 mph with UAV speeds up to 150 knots. [Need accuracy sufficient for precision weapons. Range should be sufficient to provide sanctuary from lower end mobile SAMs. Analysis required.]	Red
UCAV-N	Automatic Control System	Automatic Taxi	The UCAV-N shall be capable of safe taxi on the CV flight deck without interfering with other flight operations.	Red
HALE	Automatic Control System	Data Fusion	The HALE EO-IR subsystem shall include processing capability and capability to fuse imagery with data from other sensors so as to minimize ground station data reduction, processing and fusion by limited mission control system personnel.	Red
HALE	Automatic Control System	Data Fusion	The HALE ESM subsystem shall include data reduction & processing capability and capability to fuse data with data from other sensors so as to minimize data reduction, processing and fusion by limited mission control system personnel.	Red
HALE	Automatic Control System	Data Fusion	The HALE IRST system shall collect and send to ground station IR data in conjunction with multiple HALE vehicles to enable fused 3D targeting quality TBM tracks at theater-wide ranges.	Red

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
HALE	Automatic Control System	Data Fusion	The HALE UAV IRST shall be capable of coordinated data collects to support 3 D target quality tracking based upon multiple angle/angle solutions. The request for data collect will be assigned from an offboard source and will include: *Line of bearing from ownship *Update rate required *Start required upon notification *End request (return to search)	Red
HALE	Automatic Control System	Data Fusion	The HALE MMR subsystem shall include processing capability and capability to fuse radar data with data from other sensors so as to minimize ground station data reduction, processing and fusion by limited mission control system personnel.	Red
UCAV-N	Automatic Control System	Data Fusion	The UCAV-N EO/IR subsystem shall include data reduction & processing capability and capability to fuse data with data from other sensors so as to minimize data reduction, processing and fusion by limited mission control system personnel.	Red
UCAV-N	Automatic Control System	Data Fusion	The UCAV-N shall have sufficient autonomy such that it can be controlled by the CV control station simultaneously with 11 other UCAVs and three HALE UAVs including each vehicle's payload.	Red
HALE	Automatic Control System	Data Fusion	The HALE MMR shall report all classification/identification decisions with confidence to the communication system for dissemination through the data link architecture. The MMR shall accept cues from offboard sources and shall provide the classification and identities associated with these cues. The system shall correlate and tag any MMR data with offboard track data to facilitate offboard ID decisions. [Range will be probably be driven by defended target requirements. Analysis required.]	Yellow
HALE	Automatic Control System	Data Fusion	The HALE Multi-Mode Radar shall transfer data to a TCS in combination with an EO/IR and ESM payload at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time.	Yellow
UCAV-N	Automatic Control System	Data Fusion	The UCAV-N UAV MMR shall generate internal cues, based upon surface search mode data, for the generation of high resolution spot map and/or MTIm to facilitate the identification process at 50 nm beyond the threat envelope for an SA XX surface to air missile. The resolution of the SAR imagery shall be X meters. [The range based upon 50 nm beyond the maximum range of SA XX or SAN XX against UCAV-N to allow it to function as a gap fill land surveillance system.]	Yellow
UCAV-N	Automatic Control System	Data Fusion	The UCAV-N MMR shall report all classification/identification decisions with confidence to the communication system for dissemination through the data link architecture. The MMR shall accept cues from offboard sources and shall provide the classification and identities associated with these cues. The system shall correlate and tag any MMR data with offboard track data to facilitate offboard ID decisions.	Yellow
HALE	Automatic Control System	Data Management	The HALE EO/IR sensor shall be capable of accepting external cues and slewing to the appropriate location for supporting the identification of surface targets. The system shall provide image clips annotated with appropriate track numbers provided by external cue. The system shall support this function at XX nm beyond the threat envelope of an SA XX and SAN XX surface to air missile which is a total of XXX nm.	Red
HALE	Automatic Control System	Data Management	The HALE UAV ESM payload shall be capable of processing RF parametric data and estimating ID with confidence for reporting to the HALE communications controller. The determination of ID shall be based on an internal intelligence file that may be tailored for the region of interest.	Red
HALE	Automatic Control System	Data Management	The HALE MMR shall perform the following functions as part of the identification of fixed or mobile TBM launchers: *Accept cues from IRST or external sources and generate interval strip or spot map (based on error estimate for launch point). *Automatically form area of interest for area surrounding launch point estimate. *Track moving target inside AOI with track continuity of XX%. *X m MTIm with identification tags for assessed tracks. *Cueing of all other onboard sensors. All of these functions shall be performed at a range greater than SA XX surface to air missile range or a total of XXX nm.	Red

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
Tactical 2	Automatic Control System	Data Management	The Tactical Tier 2 UAV shall have a primary data link capable of sending and receiving all radar images, radar track data, ESM data, SIGINT data, NBC detection data, vehicle control and health information as well as all EO/IR imagery at an image rate equivalent to the radar imagery rate for all valid payload combinations at a range of 150 nm at a combined maximum rate of 45 MBS . The data shall be moved to the TCS over a time shared Data Link available for not more than 1/X of the time. [Assumes 1 antenna on ship or on beach dedicated to the Tactical Tier 2 UAV. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of UAVs that must be supported in most stressing scenario needs further analysis.]	Red
Tactical 3	Automatic Control System	Data Management	The Tactical Tier 3 UAV shall have a wideband data link capable of sending and receiving all radar images, radar track data, ESM data, SIGINT data, NBC detection data, vehicle control and health information as well as all EO/IR imagery or all valid payload combinations at a range of 150 nm at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than 1/X of the time. [Assumes 1 antenna on ship or on beach dedicated to the Tactical Tier 2 UAV. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of UAVs that must be supported in most stressing scenario needs further analysis.]	Red
Tactical 3	Automatic Control System	Data Management	The Tactical Tier 3 vehicle shall be able to exchange all vehicle health and control information using the wideband data link while it simultaneously exchanging all payload data at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than 1/X of the time. [Assumes 1 antenna on ship or on beach dedicated to the UAVs. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of UAVs that must be supported in most stressing scenario needs further analysis.]	Red
UCAV-N	Automatic Control System	Data Management	The UCAV-N EO/IR sensor shall be capable of accepting external cues and slewing to the appropriate location for supporting the identification of surface targets. The system shall provide image clips anotated with appropriate track numbers from external cue. The system shall support this function at XX nm beyond the threat envelope of an SA XX and SAN XX surface to air missiles which is XXX nm.	Red
HALE	Automatic Control System	Data Management	The HALE UAV EO/IR sensor shall be capable of generating external cues for all onboard sensors. In addition, the EO/IR sensor shall be capable of accepting cues (WGS-84 coordinates) from external sources and slewing to the target location.	Yellow
HALE	Automatic Control System	Data Management	The HALE EO-IR subsystem shall transfer imagery to a TCS in combination with a multi-mode radar and ESM payload at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time.	Yellow
HALE	Automatic Control System	Data Management	The HALE ESM subsystem shall detect and passive range ground based emmitters within X minutes of initial detection. The system shall be capable of generating cues, for the onboard multi-mode radar at ranges of 50 nm beyond the threat envelope for a SA XX surface to air missile which is XXX nm. The cue shall consist of both WGS 84 position and area of uncertainty. The ESM shall also be capable of accepting external cues based upon: *ELNOT, time, LOB or sector of interest *Frequency, time, LOB or sector of interest and altering the scan strategy to facilitate threat acquisition.	Yellow
HALE	Automatic Control System	Data Management	The HALE UAV IRST shall be capable of reporting the classification of TBMs in conjunction with the air track, error estimates and launch/splash point calculations.	Yellow

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
Tactical 2	Automatic Control System	Data Management	The Tactical Tier 2 EO-IR subsystem shall transmit imagery to a TCS in combination with all other onboard payloads at a rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than 1/X of the time. [Assumes 1 antenna on ship or on beach dedicated to the Tactical Tier 2 UAV. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of UAVs that must be supported in most stressing scenario needs further analysis.]	Yellow
Tactical 2	Automatic Control System	Data Management	The Tactical Tier 2 ESM subsystem shall transmit imagery to a TCS in combination with all other onboard payloads at a rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than 1/X of the time. [Assumes 1 antenna on ship or on beach dedicated to the Tactical Tier 2 UAV. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of Tactical Tier 2's that must be supported in most stressing scenario needs further analysis.]	Yellow
HALE	Automatic Control System	Detect, See and Avoid	The HALE Vehicle control shall be semi-autonomous to the extent that interaction with remote mission commander, pilot and payload operator can be shared with at least 1 HALE and 2 Tactical Tier 3 UAVs.	Red
Tactical 1	Automatic Control System	Detect, See and Avoid	Tactical Tier 1 Vehicle shall have the mobility and ability to operate at altitudes optimized to support EO/IR surveillance, detection and tracking of enemy vehicles and troops in an urban environment.	Red
Tactical 1	Automatic Control System	Detect, See and Avoid	Tactical Tier 1 Vehicle shall have the performance to support surveillance detection and tracking of personnel through building windows (e.g. loitering, EO-IR payload vibration isolation/control, mobility close to buildings)	Red
UCAV-N	Automatic Control System	Detect, See and Avoid	UCAV-N shall be able to operate in conjunction with manned ashore operations without disrupting the operation of the manned vehicles.	Red
HALE	Automatic Control System	Detect, See and Avoid	The HALE Vehicle shall have capability to execute lost communications airspace procedures similar to those of manned aircraft as documented in XXXXXXXXXXXX.	Yellow
HALE	Automatic Control System	Detect, See and Avoid	The HALE Vehicle shall have capability to fly pre-planned profiles if control communication is lost.	Yellow
Tactical 2	Automatic Control System	Detect, See and Avoid	Tactical Tier 2 Air Vehicles shall have see and avoid capability with sufficient reliability such that the presence of the UAV shall not impact manned aircraft operations.	Yellow
Tactical 3	Automatic Control System	Detect, See and Avoid	Tactical Tier 3 UAV vehicle control shall be semi-autonomous to the extent that interaction with the remote mission commander, pilot and payload operator can be shared with at least 1 HALE UAV and 2 Tactical Tier 3 UAVs.	Yellow
Tactical 3	Automatic Control System	Detect, See and Avoid	Tactical Tier 3 UAV pilot shall have the ability to override a flight plan immediately and perform pre-planned and real-time evasive maneuvers.	Yellow
Tactical 3	Automatic Control System	Detect, See and Avoid	Tactical Tier 3 Air Vehicles shall have see and avoid capability with sufficient reliability such that the presence of the UAV shall not impact the manned aircraft operations.	Yellow
UCAV-N	Automatic Control System	Detect, See and Avoid	UCAV-N shall have a see and avoid capability with sufficient reliability such that the presence of the UAV shall not impact manned operations.	Yellow
HALE	Automatic Control System	Mission Control	The HALE Vehicle shall have sufficient autonomy such that it can be controlled by the CV control station simultaneously with 12 UCAVs and two other HALE UAVs including each vehicle's payload. The HALE Vehicle shall also have sufficient autonomy such that it can be controlled by the LHA control station simultaneously with X Tactical UAVs and X other HALE UAVs including each vehicle's payload. [LHA numbers not provided in OCD. Requires analysis of OCD to determine maximum number necessary to perform as documented.]	Red
HALE	Automatic Control System	Mission Control	The HALE Vehicle control shall be semi-autonomous to the extent that interaction with remote mission commander, pilot and payload operator can be shared with at least 1 HALE and 2 Tactical Tier 3 UAVs.	Red
Tactical 1	Automatic Control System	Mission Control	Tactical Tier 1 Vehicle shall support (e.g., payload vibration isolation and control) EO/IR identification of hostile and friendly personnel through windows in buildings.	Red
Tactical 1	Automatic Control System	Mission Control	Tactical Tier 1 Vehicle shall have the mobility and ability to operate at altitudes optimized to support EO/IR surveillance, detection and tracking of enemy vehicles and troops in an urban environment.	Red

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
Tactical 1	Automatic Control System	Mission Control	Tactical Tier 1 Vehicle shall have the performance to support surveillance detection and tracking of personnel through building windows (e.g. loitering, EO-IR payload vibration isolation/control, mobility close to buildings)	Red
UCAV-N	Automatic Control System	Mission Control	UCAV-N shall be able to operate in conjunction with manned ashore operations without disrupting the operation of the manned vehicles.	Red
UCAV-N	Automatic Control System	Mission Control	UCAV-N shall be able to perform surface attacks.	Red
UCAV-N	Automatic Control System	Mission Control	The UCAV-N shall have sufficient autonomy such that it can be controlled by the CV control station simultaneously with 11 other UCAVs and three HALE UAVs including each vehicle's payload.	Red
UCAV-N	Automatic Control System	Mission Control	The UCAV-N shall have a wideband data link capable of including all ESM data, SIGINT data, NBC detection data, vehicle control and health information as well as all EO/IR imagery at an image reate equivalent to the radar imagery rate for all valid payload combinations at a range of 250 nm at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time. [For the range $1.23 * \sqrt{45,000\text{ft}}$ = approx 250nm. As far as one third... There can be as many as 12 UCAVs airborne at once. This is not a reasonable number to timeshare the one shipboard antenna or the one HALE relay package. The scenarios indicate that the UCAVs are only collecting imagery and other data over short periods of their flights. Here we make the assumption that the one third requirement is the same as the HALE UAV time share and that we will manage the 12 UCAVs data streams such that no single UAV requires more than one third and most require much less. Needs more description and analysis.]	Red
HALE	Automatic Control System	Mission Control	The HALE EO-IR payload shall have sufficient resolution (NIIRS X) for supporting detection, tracking and cueing of onboard and offboard sensors for surface combatants, surfaced submarines, and small commercial vessels in blue water and the littorals. The system resolution shall be supported at ranges of XX nm beyond the threat envelope of an SA XX and SAN XX surface to air missiles.	Yellow
HALE	Automatic Control System	Mission Control	The HALE ESM system shall be capable of accepting external cues to support coordinated data collects that will accomodate precision geolocation of threat emmitters.	Yellow
Tactical 1	Automatic Control System	Mission Control	The Tactical Tier 1 EO/IR shall be able to execute an automatic search. The system shall be capable of coordinated automatic search in conjunction with AV search patterns and shall have auto track capabilities. The system also shall be capable of camera guide and shall be capable of target location accuracy within 10M at ranges of 6,000 ft. [Range to provide standoff from small arms.]	Yellow
Tactical 3	Automatic Control System	Mission Control	Tactical Tier 3 UAV vehicle control shall be semi-autonomous to the extent that interaction with the remote mission commander, pilot and payload operator can be shared with at least 1 Hale UAV and 2 Tactical Tier 3 UAVs.	Yellow
Tactical 3	Automatic Control System	Mission Control	Tactical Tier 3 UAV pilot shall have the ability to override a flight plan immediately and perform pre-planned and real-time evasive maneuvers.	Yellow
UCAV-N	Automatic Control System	Mission Control	UCAV-N shall support payloads that provide the fire control solution of moving land forces for 50 nm beyond the range of SA XX surface to air missiles.	Yellow
UCAV-N	Automatic Control System	Mission Control	UCAV-N shall support payloads to perform identification of moving land forces for 50 nm beyond the range of SA XX surface to air missiles.	Yellow
UCAV-N	Automatic Control System	Mission Control	UCAV-N shall support payloads to perform reconnaissance of moving land forces for 50 nm beyond the range of SA XX surface to air missiles.	Yellow
UCAV-N	Automatic Control System	Mission Control	The UCAV-N shall be capable of attacking both stationary and mobile TBM launchers using HALE surveillance and targeting information	Yellow
UCAV-N	Automatic Control System	Mission Control	The UCAV-N shall be capable of attacking surface combatants, cargo ships and coastal craft in the littoral environment using HALE surveillance and targeting information	Yellow
HALE	Automatic Control System	Payload Control	The HALE EO/IR sensor shall be capable of accepting external cues and slewing to the appropriate location for supporting the identification of surface targets. The system shall provide image clips anotated with appropriate track numbers provided by external cue. The system shall support this function at XX nm beyond the threat envelope of an SA XX and SAN XX surface to air missile which is a total of XXX nm.	Red

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
HALE	Automatic Control System	Payload Control	The HALE ESM system shall be capable of analyzing the received RF activities and formulating/forwarding area of interest alerts that exhibit concentrated RF signatures that may indicate large scale land force movement. The system shall be capable of generating cues, based on passive ranging techniques for onboard payloads (eg. EO/IR, Multimode radar), that include position (WGS 84) and area of uncertainty. The system sensitivity shall accommodate this requirement at 50 nm beyond the threat envelope for a SA XX surface to air missile.	Red
HALE	Automatic Control System	Payload Control	The HALE Vehicle shall have sufficient autonomy such that it can be controlled by the CV control station simultaneously with 12 UCAVs and two other HALE UAVs including each vehicle's payload. The HALE Vehicle shall also have sufficient autonomy such that it can be controlled by the LHA control station simultaneously with X Tactical UAVs and X other HALE UAVs including each vehicle's payload. [LHA numbers not provided in OCD. Requires analysis of OCD to determine maximum number necessary to perform as documented.]	Red
HALE	Automatic Control System	Payload Control	The HALE Vehicle control shall be semi-autonomous to the extent that interaction with remote mission commander, pilot and payload operator can be shared with at least 1 HALE and 2 Tactical Tier 3 UAVs.	Red
HALE	Automatic Control System	Payload Control	The HALE UAV shall have a SATCOM data link capable of capable of Level 4 control including all radar images, radar track data, ESM data, SIGINT data, NBC detection data, vehicle control and health information as well as all EO/IR imagery at an image rate equivalent to the radar imagery rate for all valid payload combinations.	Red
HALE	Automatic Control System	Payload Control	The HALE UAV shall have a primary data link capable of Level 4 control including all radar images, radar track data, ESM data, SIGINT data, NBC detection data, vehicle control and health information as well as all EO/IR imagery at an image rate equivalent to the radar imagery rate for all valid payload combinations at a range of 300 nm at a combined maximum rate of 45 MBS. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time.	Red
UCAV-N	Automatic Control System	Payload Control	The UCAV-N ESM system shall be capable of analyzing the received RF activities and formulating/forwarding area of interest alerts that exhibit concentrated RF signatures that may indicate large scale land force movement. The system shall be capable of generating cues, based on passive ranging techniques for onboard payloads (eg. EO/IR, Multimode radar), that include position (WGS 84) and area of uncertainty. The system sensitivity shall accommodate this requirement at 50 nm beyond the threat envelope for a SA XX surface to air missile.	Red
UCAV-N	Automatic Control System	Payload Control	The UCAV-N shall have a wideband data link capable of including all ESM data, SIGINT data, NBC detection data, vehicle control and health information as well as all EO/IR imagery at an image reate equivalent to the radar imagery rate for all valid payload combinations at a range of 250 nm at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time. [For the range $1.23 * \sqrt{45,000\text{ft}}$ = approx 250nm. As far as one third... There can be as many as 12 UCAVs airborne at once. This is not a reasonable number to timeshare the one shipboard antenna or the one HALE relay package. The scenarios indicate that the UCAVs are only collecting imagery and other data over short periods of their flights. Here we make the assumption that the one third requirement is the same as the HALE UAV time share and that we will manage the 12 UCAVs data streams such that no single UAV requires more than one third and most require much less. Needs more description and analysis.]	Red
HALE	Automatic Control System	Payload Control	The HALE UAV EO/IR sensor shall be capable of generating external cues for all onboard sensors. In addition, the EO/IR sensor shall be capable of accepting cues (WGS-84 coordinates) from external sources and slewing to the target location.	Yellow

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
HALE	Automatic Control System	Payload Control	The HALE ESM subsystem shall detect and passive range ground based emitters within X minutes of initial detection. The system shall be capable of generating cues, for the onboard multi-mode radar at ranges of 50 nm beyond the threat envelope for a SA XX surface to air missile which is XXX nm. The cue shall consist of both WGS 84 position and area of uncertainty. The ESM shall also be capable of accepting external cues based upon: *ELNOT, time, LOB or sector of interest *Frequency, time, LOB or sector of interest and altering the scan strategy to facilitate threat acquisition.	Yellow
HALE	Automatic Control System	Payload Control	The HALE MMR shall report all classification/identification decisions with confidence to the communication system for dissemination through the data link architecture. The MMR shall accept cues from offboard sources and shall provide the classification and identities associated with these cues. The system shall correlate and tag any MMR data with offboard track data to facilitate offboard ID decisions. [Range will be probably be driven by defended target requirements. Analysis required.]	Yellow
HALE	Automatic Control System	Payload Control	The HALE UAV MMR shall generate internal cues, based upon surface search mode data, for the generation of high resolution spot map and/or ISAR to facilitate the identification process at a range greater than SAN XX or SA XX surface to air missile range or a total of XXX nm. The resolution of the SAR imagery shall be X meters.	Yellow
Tactical 1	Automatic Control System	Payload Control	The Tactical Tier 1 EO/IR shall be able to execute an automatic search. The system shall be capable of coordinated automatic search in conjunction with AV search patterns and shall have auto track capabilities. The system also shall be capable of camera guide and shall be capable of target location accuracy within 10M at ranges of 6,000 ft. [Range to provide standoff from small arms.]	Yellow
Tactical 3	Automatic Control System	Payload Control	The Tactical Tier 3 EO-IR subsystem shall transfer imagery to a TCS in combination with all other installed payloads at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than 1/3 of the time. [Assumes 1 antenna on ship or on beach dedicated to the Tactical Tier 2 UAV. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of UAVs that must be supported in most stressing scenario needs further analysis.]	Yellow
Tactical 3	Automatic Control System	Payload Control	The Tactical Tier 3 EO-IR subsystem shall support the mid course guidance updates for weapons launched against fixed and moving vehicles in an urban environment at ranges of XX nm for maximum vehicle speeds up to 60 mph with UAV speeds up to 150 knots. [Range should be sufficient to provide sanctuary from lower end mobile SAMs. Analysis required.]	Yellow
Tactical 3	Automatic Control System	Payload Control	The Tactical Tier 3 ESM subsystem shall transfer data to the TCS in combination with the EO/IR payload at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than 1/X of the time. [Assumes 1 antenna on ship or on beach dedicated to the Tactical Tier 2 UAV. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of UAVs that must be supported in most stressing scenario needs further analysis.]	Yellow
Tactical 3	Automatic Control System	Payload Control	The Tactical Tier 3 multi-mode radar subsystem shall transfer data to the TCS in combination with all valid payload combinations at a combined maximum rate not to exceed 45 Mbps. The data shall be moved to the TCS over a time shared data link available for not more than 1/3 of the time. [Assumes 1 antenna on ship or on beach dedicated to the Tactical Tier 2 UAV. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of UAVs that must be supported in most stressing scenario needs further analysis.]	Yellow
UCAV-N	Automatic Control System	Payload Control	The UCAV-N EO/IR subsystem shall require minimum inputs and control by the payload operator and mission requirements shall be pre-programmable.	Yellow

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
UCAV-N	Automatic Control System	Payload Control	The UCAV-N ESM subsystem shall require minimum inputs and control by the payload operator and mission requirements shall be pre-programmable.	Yellow
UCAV-N	Automatic Control System	Payload Control	The UCAV-N Laser Designator system shall be semi-autonomous to the extent that the attention and intervention of a crew's two payload operators can be shared with other payloads on the same and other air vehicles.	Yellow
UCAV-N	Automatic Control System	Payload Control	The UCAV-N MMR payload shall be semi-autonomous to the extent that the attention and intervention of a crew's two payload operators can be shared with other payloads on the same and other air vehicles.	Yellow
UCAV-N	Automatic Control System	Payload Control	The UCAV-N UAV MMR shall generate internal cues, based upon surface search mode data, for the generation of high resolution spot map and/or MTIm to facilitate the identification process at 50 nm beyond the threat envelope for an SA XX surface to air missile. The resolution of the SAR imagery shall be X meters. [The range based upon 50 nm beyond the maximum range of SA XX or SAN XX against UCAV-N to allow it to function as a gap fill land surveillance system.]	Yellow
UCAV-N	Automatic Control System	Payload Control	The MMR shall accept cueing from offboard sensors to acquire a target of interest and provide ISAR images of the target of sufficient quality to enable identifying targets at least 3 meters long and .5 meter high (small boat) operating within 100 meters of shore. [The range based upon 50 nm beyond the maximum range of SA XX or SAN XX against UCAV-N to allow it to function as a gap fill land surveillance system.]	Yellow
UCAV-N	Automatic Control System	Payload Control	The UCAV-N NBC Detection payload shall be semi-autonomous to the extent that the attention and intervention of a crew's two payload operators can be shared with other payloads on the same and other air vehicles.	Yellow
UCAV-N	Automatic Control System	Payload Control	The UCAV-N Survivability payload shall be semi-autonomous to the extent that the attention and intervention of a crew's two payload operators can be shared with other payloads on the same and other air vehicles.	Yellow
UCAV-N	Automatic Control System	Payload Control	UCAV-N shall support payloads that provide the fire control solution of moving land forces for 50 nm beyond the range of SA XX surface to air missiles.	Yellow
UCAV-N	Automatic Control System	Payload Control	UCAV-N shall support payloads to perform identification of moving land forces for 50 nm beyond the range of SA XX surface to air missiles.	Yellow
UCAV-N	Automatic Control System	Payload Control	UCAV-N shall support payloads to perform reconnaissance of moving land forces for 50 nm beyond the range of SA XX surface to air missiles.	Yellow
UCAV-N	Automatic Control System	Payload Control	The UCAV-N shall be capable of attacking both stationary and mobile TBM launchers using HALE surveillance and targeting information	Yellow
UCAV-N	Automatic Control System	Payload Control	The UCAV-N shall be capable of attacking surface combatants, cargo ships and coastal craft in the littoral environment using HALE surveillance and targeting information	Yellow
UCAV-N	Automatic Control System	Payload Control	The UCAV-N Weapons System payload shall be semi-autonomous to the extent that the attention and intervention of a crew's two payload operators can be shared with other payloads on the same and other air vehicles.	Yellow
UCAV-N	Automatic Control System	Payload Control	The UCAV-N Weapons subsystem shall accomodate weapons acquisition for anti-radiation Missiles and Laser Guided Bombss released from the air vehicle.	Yellow
HALE	Autonomous Network	LAN	The HALE MMR subsystem shall include processing capability and capability to fuse radar data with data from other sensors so as to minimize ground station data reduction, processing and fusion by limited mission control system personnel.	Red
HALE	Autonomous Network	LAN	The HALE Vehicle shall have sufficient autonomy such that it can be controlled by the CV control station simultaneously with 12 UCAVs and two other HALE UAVs including each vehicle's payload. The HALE Vehicle shall also have sufficient autonomy such that it can be controlled by the LHA control station simultaneously with X Tactical UAVs and X other HALE UAVs including each vehicle's payload. [LHA numbers not provided in OCD. Requires analysis of OCD to determine maximum number necessary to perform as documented.]	Red
HALE	Autonomous Network	LAN	The HALE Vehicle control shall be semi-autonomous to the extent that interaction with remote mission commander, pilot and payload operator can be shared with at least 1 HALE and 2 Tactical Tier 3 UAVs.	Red

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
HALE	Autonomous Network	LAN	The HALE UAV shall have a SATCOM data link capable of capable of Level 4 control including all radar images, radar track data, ESM data, SIGINT data, NBC detection data, vehicle control and health information as well as all EO/IR imagery at an image rate equivalent to the radar imagery rate for all valid payload combinations.	Red
HALE	Autonomous Network	LAN	The HALE UAV shall have a primary data link capable of Level 4 control including all radar images, radar track data, ESM data, SIGINT data, NBC detection data, vehicle control and health information as well as all EO/IR imagery at an image rate equivalent to the radar imagery rate for all valid payload combinations at a range of 300 nm at a combined maximum rate of 45 MBS. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time.	Red
HALE	Autonomous Network	LAN	The HALE UAV shall have a primary data link capable of providing the TCS with all radar images, radar track data, ESM data, SIGINT data, NBC detection data, vehicle control and health information as well as all EO/IR imagery.	Red
Tactical 3	Autonomous Network	LAN	The Tactical Tier 3 UAV shall have a wideband data link capable of sending and receiving all radar images, radar track data, ESM data, SIGINT data, NBC detection data, vehicle control and health information as well as all EO/IR imagery or all valid payload combinations at a range of 150 nm at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than 1/X of the time. [Assumes 1 antenna on ship or on beach dedicated to the Tactical Tier 2 UAV. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of UAVs that must be supported in most stressing scenario needs further analysis.]	Red
UCAV-N	Autonomous Network	LAN	The UCAV-N shall have sufficient autonomy such that it can be controlled by the CV control station simultaneously with 11 other UCAVs and three HALE UAVs including each vehicle's payload.	Red
UCAV-N	Autonomous Network	LAN	The UCAV-N shall have a wideband data link capable of including all ESM data, SIGINT data, NBC detection data, vehicle control and health information as well as all EO/IR imagery at an image reate equivalent to the radar imagery rate for all valid payload combinations at a range of 250 nm at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time. [For the range $1.23 * \sqrt{45,000\text{ft}}$ = approx 250nm. As far as one third... There can be as many as 12 UCAVs airborne at once. This is not a reasonable number to timeshare the one shipboard antenna or the one HALE relay package. The scenarios indicate that the UCAVs are only collecting imagery and other data over short periods of their flights. Here we make the assumption that the one third requirement is the same as the HALE UAV time share and that we will manage the 12 UCAVs data streams such that no single UAV requires more than one third and most require much less. Needs more description and analysis.]	Red
HALE	Autonomous Network	LAN	The HALE UAV communication relay package shall be able to sequentially relay wideband sensor data from multiple UAVs. The time to switch between UAVs shall be less than X.X seconds.	Yellow
HALE	Autonomous Network	LAN	The HALE UAV EO/IR sensor shall be capable of generating external cues for all onboard sensors. In addition, the EO/IR sensor shall be capable of accepting cues (WGS-84 coordinates) from external sources and slewing to the target location.	Yellow
HALE	Autonomous Network	LAN	The HALE ESM system shall be capable of accepting external cues to support coordinated data collects that will accomodate precision geolocation of threat emmitters.	Yellow
HALE	Autonomous Network	LAN	The HALE UAV shall have a primary data link capable of exchanging C2, status and payload information with the shore based TCS facility concurrently with three other HALE UAVs.	Yellow

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
Tactical 2	Autonomous Network	LAN	The Tactical Tier 2 ESM subsystem shall transmit imagery to a TCS in combination with all other onboard payloads at a rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than 1/X of the time. [Assumes 1 antenna on ship or on beach dedicated to the Tactical Tier 2 UAV. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of Tactical Tier 2's that must be supported in most stressing scenario needs further analysis.]	Yellow
Tactical 3	Autonomous Network	LAN	Tactical Tier 3 UAV vehicle control shall be semi-autonomous to the extent that interaction with the remote mission commander, pilot and payload operator can be shared with at least 1 Hale UAV and 2 Tactical Tier 3 UAVs.	Yellow
UCAV-N	Autonomous Network	LAN	The UCAV-N ESM subsystem shall transfer data to a TCS in combination with all valid payload mixtures at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time. [There can be as many as 12 UCAVs airborne at once. This is not a reasonable number to timeshare the one shipboard antenna or the one HALE relay package. The scenarios indicate that the UCAVs are only collecting imagery and other data over short periods of their flights. Here we make the assumption that the one third requirement is the same as the HALE UAV time share and that we will manage the 12 UCAVs data streams such that no single UAV requires more than one third and most require much less. Needs more description and analysis.]	Yellow
UCAV-N	Autonomous Network	LAN	The UCAV-N Laser Designator system shall be semi-autonomous to the extent that the attention and intervention of a crew's two payload operators can be shared with other payloads on the same and other air vehicles.	Yellow
UCAV-N	Autonomous Network	LAN	The UCAV-N MMR payload shall be semi-autonomous to the extent that the attention and intervention of a crew's two payload operators can be shared with other payloads on the same and other air vehicles.	Yellow
UCAV-N	Autonomous Network	LAN	The UCAV-N Survivability payload shall be semi-autonomous to the extent that the attention and intervention of a crew's two payload operators can be shared with other payloads on the same and other air vehicles.	Yellow
UCAV-N	Autonomous Network	LAN	The UCAV-N Weapons System payload shall be semi-autonomous to the extent that the attention and intervention of a crew's two payload operators can be shared with other payloads on the same and other air vehicles.	Yellow
HALE	Autonomous Network	WAN	The HALE UAV communication relay package shall be able to simultaneously relay the narrowband C2, status and voice communication for up to twelve other UAVs with a maximum UAV to Hale range of 250 nm and a HALE to ship maximum range of 300nm. [Most stressing is CV with 3 HALE and 12 UCAVs. Assume one of the three HALEs provide relay to the 12 UCAVs with HALE LOS based on 60,000 ft and UCAV LOS at 45,000 ft.]	Yellow
TCS	AV Control		The land based mobile TCS shall be capable of controlling at least six Tactical AVs of the same or different type simultaneously [SPS275].	Red
TCS	AV Control		The land based mobile TCS shall be capable of controlling six or more Tactical AVs simultaneously with at least three under LOS and at least three under BLOS data link control [SPS520].	Red
TCS	AV Control		The land based mobile TCS shall be capable of simultaneous flight control of at least six Tactical AVs of the same type via the BLOS DLS(s) [SPS274].	Red
TCS	AV Control		The land based mobile TCS shall be capable of simultaneous flight control of at least six Tactical AVs of the same type via LOS DLS(s) [SPS273].	Red
TCS	AV Control		The TCS shall be able to reprogram the air vehicle GPS system in flight.	Red
TCS	AV Control		The CV based TCS shall be capable of simultaneous flight control of at least twelve UCAV-Ns via LOS DLS(s) [SPS273].	Red
TCS	AV Control		The land based transportable TCS shall be capable of simultaneous flight control of at least four HALE AVs via LOS DLS(s) [SPS273].	Red
TCS	AV Control		The surface ship based TCS shall be capable of simultaneous flight control of at least two AVs of the same type and one AV of a different type via BLOS DLS(s) [SPS274].	Yellow

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
TCS	AV Control		The surface ship based TCS shall be capable of simultaneous flight control of at least two AVs of the same type and one AV of a different type via LOS DLS(s) [compare to SPS273 and SPS275]. (Single crew of 3: MC, Payload Operator, Air Vehicle Operator)	Yellow
TCS	AV Control		The surface ship based TCS shall be capable of controlling three or more AVs simultaneously with at least one under LOS and at least one under BLOS data link control [SPS520].	Yellow
TCS	AV Control		TCS shall provide sufficient cues, instrumentation, displays and controls to allow the UAV operator to safely aviate under Instrument Flight Rules.	Yellow
TCS	AV Control		The man portable TCS shall provide the capability to command and control future tactical and MAE UAVs across the first four levels of interaction [SPS261, compare with SPS004, SPS005, SPS006, SPS007, SPS008, and SPS259].	Yellow
TCS	AV Control		The TCS shall support UAV situational awareness and collision avoidance systems to allow safe operation with x other manned or unmanned Avs.	Yellow
TCS	C4I		The TCS shall be capable of exchanging data with current and planned selected DOD C4I systems including the Cooperative Engagement Capability.	Red
TCS	C4I		Each TCS installation shall interface with specified C4I systems per the JTA (see complete list below).	Yellow
TCS	C4I		The TCS shall be capable of receiving imagery, laser guidance data, and targeting information from selected DOD weapons systems.	Yellow
TCS	C4I		TCS shall support digital interfaces for the receipt and dissemination of motion and still imagery [SPS037].	Yellow
TCS	C4I		TCS shall support the number of motion imagery interfaces defined by the Service implementation plan for the UAV GCS [SPS445].	Yellow
HALE	Data Link	Antenna	The HALE Vehicle control shall be semi-autonomous to the extent that interaction with remote mission commander, pilot and payload operator can be shared with at least 1 HALE and 2 Tactical Tier 3 UAVs.	Red
HALE	Data Link	Antenna	The HALE UAV shall have a primary data link capable of providing the TCS with all radar images, radar track data, ESM data, SIGINT data, NBC detection data, vehicle control and health information as well as all EO/IR imagery.	Red
HALE	Data Link	Antenna	The HALE UAV shall have a SATCOM data link capable of Level 4 control including all radar images, radar track data, SIGINT data, NBC detection data, vehicle control and health information as well as all EO/IR imagery at an image rate equivalent to the radar imagery rate for all valid payload combinations.	Red
HALE	Data Link	Antenna	The HALE UAV shall have a primary data link capable of Level 4 control including all radar images, radar track data, ESM data, SIGINT data, NBC detection data, vehicle control and health information as well as all EO/IR imagery at an image rate equivalent to the radar imagery rate for all valid payload combinations at a range of 300 nm at a combined maximum rate of 45 MBS. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time.	Red
Tactical 2	Data Link	Antenna	The Tactical Tier 2 UAV shall have a primary data link capable of providing the submarine TCS with previously recorded radar images, radar track data, ESM data, SIGINT data, NBC detection data, vehicle control and health information as well as all EO/IR imagery at a rate of 45 MB/S. [Since the system will have the ability to record and download to sub later as part of cover nature, the necessity to service multiple UAVs will be mitigated. This requirement is driven by the submarine launched UAV elements of the OCD.]	Red
Tactical 2	Data Link	Antenna	The Tactical Tier 2 UAV shall have a primary data link capable of sending and receiving all radar images, radar track data, ESM data, SIGINT data, NBC detection data, vehicle control and health information as well as all EO/IR imagery at an image rate equivalent to the radar imagery rate for all valid payload combinations at a range of 150 nm at a combined maximum rate of 45 MBS. The data shall be moved to the TCS over a time shared Data Link available for not more than 1/X of the time. [Assumes 1 antenna on ship or on beach dedicated to the Tactical Tier 2 UAV. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of UAVs that must be supported in most stressing scenario needs further analysis.]	Red

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
Tactical 3	Data Link	Antenna	The Tactical Tier 3 UAV shall have a wideband data link capable of sending and receiving all radar images, radar track data, ESM data, SIGINT data, NBC detection data, vehicle control and health information as well as all EO/IR imagery or all valid payload combinations at a range of 150 nm at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than 1/X of the time. [Assumes 1 antenna on ship or on beach dedicated to the Tactical Tier 2 UAV. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of UAVs that must be supported in most stressing scenario needs further analysis.]	Red
Tactical 3	Data Link	Antenna	The Tactical Tier 3 vehicle shall be able to exchange all vehicle health and control information using the wideband data link while it simultaneously exchanging all payload data at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than 1/X of the time. [Assumes 1 antenna on ship or on beach dedicated to the UAVs. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of UAVs that must be supported in most stressing scenario needs further analysis.]	Red
UCAV-N	Data Link	Antenna	UCAV-N shall be able to operate in conjunction with manned ashore operations without disrupting the operation of the manned vehicles.	Red
UCAV-N	Data Link	Antenna	The UCAV-N shall have a wideband data link capable of including all ESM data, SIGINT data, NBC detection data, vehicle control and health information as well as all EO/IR imagery at an image rate equivalent to the radar imagery rate for all valid payload combinations at a range of 250 nm at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time. [For the range $1.23 * \sqrt{45,000\text{ft}}$ = approx 250nm. As far as one third... There can be as many as 12 UCAVs airborne at once. This is not a reasonable number to timeshare the one shipboard antenna or the one HALE relay package. The scenarios indicate that the UCAVs are only collecting imagery and other data over short periods of their flights. Here we make the assumption that the one third requirement is the same as the HALE UAV time share and that we will manage the 12 UCAVs data streams such that no single UAV requires more than one third and most require much less. Needs more description and analysis.]	Red
HALE	Data Link	Antenna	The HALE UAV communication relay package shall be able to simultaneously relay the narrowband C2, status and voice communication for up to twelve other UAVs with a maximum UAV to HALE range of 250 nm and a HALE to ship maximum range of 300nm. [Most stressing is CV with 3 HALE and 12 UCAVs. Assume one of the three HALEs provide relay to the 12 UCAVs with HALE LOS based on 60,000 ft and UCAV LOS at 45,000 ft.]	Yellow
HALE	Data Link	Antenna	The HALE UAV communication relay package shall be able to relay a peak wideband load of 45 MB/S duplexed.	Yellow
HALE	Data Link	Antenna	The HALE UAV communication relay payload shall be able to relay to/from special forces on the ground at XX nm and to/from a ship at 300 nm. The communication relay payload shall be able to relay UHF, VHF, Link-16 and CDL voice and data. The uplink from the special forces ground station to the HALE UAV shall be covert.	Yellow
HALE	Data Link	Antenna	The HALE UAV communication relay package shall be able to sequentially relay wideband sensor data from multiple UAVs. The time to switch between UAVs shall be less than X.X seconds.	Yellow
HALE	Data Link	Antenna	The HALE UAV communication relay package shall be able to receive and transmit wide and narrow band data to a maximum range of 300 nm each way for HALE to HALE relay or a total distance of 600 nm. for other UAVs the total relay distance shall equal 300 nm plus the RF line of sight for the relayed UAV.	Yellow
HALE	Data Link	Antenna	The HALE EO-IR subsystem shall transfer imagery to a TCS in combination with a multi-mode radar and ESM payload at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time.	Yellow

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
HALE	Data Link	Antenna	The HALE ESM subsystem shall transfer data to a TCS in combination with a multi-mode radar and EO/IR payload at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time.	Yellow
HALE	Data Link	Antenna	The HALE Multi-Mode Radar shall transfer data to a TCS in combination with an EO/IR and ESM payload at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time.	Yellow
HALE	Data Link	Antenna	The HALE UAV shall have a primary data link capable of exchanging C2, status and payload information with the shore based TCS facility concurrently with three other HALE UAVs.	Yellow
HALE	Data Link	Antenna	The HALE UAV shall have a primary data link capable of providing C2, status and payload information to a Line-of-Sight (LOS) TCS and to a Beyond LOS (BLOS) TCS using a HALE UAV as a relay.	Yellow
HALE	Data Link	Antenna	The HALE UAV primary data link shall be able to provide C2, status and payload information to a TCS at a distance of 600 nm using another HALE UAV as a relay.	Yellow
Tactical 2	Data Link	Antenna	The Tactical Tier 2 EO-IR subsystem shall transmit imagery to a TCS in combination with all other onboard payloads at a rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than 1/X of the time. [Assumes 1 antenna on ship or on beach dedicated to the Tactical Tier 2 UAV. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of UAVs that must be supported in most stressing scenario needs further analysis.]	Yellow
Tactical 2	Data Link	Antenna	The Tactical Tier 2 ESM subsystem shall transmit imagery to a TCS in combination with all other onboard payloads at a rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than 1/X of the time. [Assumes 1 antenna on ship or on beach dedicated to the Tactical Tier 2 UAV. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of Tactical Tier 2's that must be supported in most stressing scenario needs further analysis.]	Yellow
Tactical 2	Data Link	Antenna	The Tactical Tier 2 UAV shall have a primary data link capable of covertly exchanging C2 information and downloading selected payload data.	Yellow
Tactical 2	Data Link	Antenna	The Tactical Tier 2 UAV shall have a primary data link capable of simultaneously transmitting level 2 payload data to amphibious ships while under control of Naval landing craft and forces ashore.	Yellow
Tactical 2	Data Link	Antenna	The Tactical Tier 2 UAV primary data link shall be able to provide C2, status and payload information to a TCS at a distance of 450 nm using a HALE UAV as a relay. [Based upon 300 nm from TCS to HALE and 150 nm from Tactical Tier 2 to HALE. 150 nm is based upon $1.23 \times \sqrt{15,000 \text{ ft}}$.]	Yellow
Tactical 3	Data Link	Antenna	The Tactical Tier 3 EO-IR subsystem shall transfer imagery to a TCS in combination with all other installed payloads at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than 1/3 of the time. [Assumes 1 antenna on ship or on beach dedicated to the Tactical Tier 2 UAV. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of UAVs that must be supported in most stressing scenario needs further analysis.]	Yellow
Tactical 3	Data Link	Antenna	The Tactical Tier 3 ESM subsystem shall transfer data to the TCS in combination with the EO/IR payload at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than 1/X of the time. [Assumes 1 antenna on ship or on beach dedicated to the Tactical Tier 2 UAV. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of UAVs that must be supported in most stressing scenario needs further analysis.]	Yellow

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
Tactical 3	Data Link	Antenna	The Tactical Tier 3 multi-mode radar subsystem shall transfer data to the TCS in combination with all valid payload combinations at a combined maximum rate not to exceed 45 Mbps. The data shall be moved to the TCS over a time shared data link available for not more than 1/3 of the time. [Assumes 1 antenna on ship or on beach dedicated to the Tactical Tier 2 UAV. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of UAVs that must be supported in most stressing scenario needs further analysis.]	Yellow
Tactical 3	Data Link	Antenna	The Tactical Tier 3 UAV primary data link shall be able to provide C2, status and payload information to a TCS at a distance of 450 nm using a HALE UAV as a relay. [Range based upon LOS from TCS to HALE and the Tactical Tier 3 LOS range based upon $1.23 \times \sqrt{15,000\text{ft}}$]	Yellow
UCAV-N	Data Link	Antenna	The UCAV-N EO-IR subsystem shall transfer imagery to a TCS in combination with all valid UCAV payload combinations at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time. [There can be as many as 12 UCAVs airborne at once. This is not a reasonable number to timeshare the one shipboard antenna or the one HALE relay package. The scenarios indicate that the UCAVs are only collecting imagery and other data over short periods of their flights. Here we make the assumption that the one third requirement is the same as the HALE UAV time share and that we will manage the 12 UCAVs data streams such that no single UAV requires more than one third and most require much less. Needs more description and analysis.]	Yellow
UCAV-N	Data Link	Antenna	The UCAV-N ESM subsystem shall transfer data to a TCS in combination with all valid payload mixtures at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time. [There can be as many as 12 UCAVs airborne at once. This is not a reasonable number to timeshare the one shipboard antenna or the one HALE relay package. The scenarios indicate that the UCAVs are only collecting imagery and other data over short periods of their flights. Here we make the assumption that the one third requirement is the same as the HALE UAV time share and that we will manage the 12 UCAVs data streams such that no single UAV requires more than one third and most require much less. Needs more description and analysis.]	Yellow
UCAV-N	Data Link	Antenna	The UCAV-N multi-mode radar subsystem shall transfer imagery to a TCS in combination with all valid UCAV payload combinations at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time. [There can be as many as 12 UCAVs airborne at once. This is not a reasonable number to timeshare the one shipboard antenna or the one HALE relay package. The scenarios indicate that the UCAVs are only collecting imagery and other data over short periods of their flights. Here we make the assumption that the one third requirement is the same as the HALE UAV time share and that we will manage the 12 UCAVs data streams such that no single UAV requires more than one third and most require much less. Needs more description and analysis.]	Yellow
UCAV-N	Data Link	Antenna	The NBC detection system shall provide transfer data to the TCS in combination with all other payloads at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a single time shared data link available for not more than one third of the time. [There can be as many as 12 UCAVs airborne at once. This is not a reasonable number to timeshare the one shipboard antenna or the one HALE relay package. The scenarios indicate that the UCAVs are only collecting imagery and other data over short periods of their flights. Here we make the assumption that the one third requirement is the same as the HALE UAV time share and that we will manage the 12 UCAVs data streams such that no single UAV requires more than one third and most require much less. Needs more description and analysis.]	Yellow

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
Tactical 3	Data Link	Data Management	The Tactical Tier 3 vehicle shall be able to exchange all vehicle health and control information using the wideband data link while it simultaneously exchanging all payload data at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than 1/X of the time. [Assumes 1 antenna on ship or on beach dedicated to the UAVs. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of UAVs that must be supported in most stressing scenario needs further analysis.]	Red
TCS	Data Link	Encryption	The submarine based TCS shall be capable of covertly downloading imagery in real time.	Red
TCS	Data Link	Interoperability & Standards	TCS shall be interoperable with other TCS-compliant GCSs [SPS105]. The interface mechanism supporting this interoperability can be via a Data Link System, a computer network or other electronic means.	Red
TCS	Data Link	Man Portable Wideband	The man portable TCS shall be of a compact size and weight to allow an operator to manually transport.	Red
TCS	Data Link	Man Portable Wideband	The man transportable TCS shall provide one UHF/VHF radio that can relay voice and data (including imagery products) via the HALE UAV.	Red
UCAV-N	Data Link	Narrowband	The UCAV-N narrowband data link shall be able to communicate to the TCS via a relay through the HALE UAV located at least 250 nm away. [Range gased upon $1.23 \times \sqrt{45,000\text{ft}} = \text{approx } 250\text{nm}$]	Red
TCS	Data Link	Narrowband	The land based mobile TCS shall be capable of controlling at least six Tactical AVs of the same or different type simultaneously [SPS275].	Yellow
TCS	Data Link	Narrowband	The land based mobile TCS shall be capable of controlling six or more Tactical AVs simultaneously with at least three under LOS and at least three under BLOS data link control [SPS520].	Yellow
TCS	Data Link	Narrowband	The land based mobile TCS shall be capable of simultaneous flight control of at least six Tactical AVs of the same type via the BLOS DLS(s) [SPS274].	Yellow
TCS	Data Link	Narrowband	The land based mobile TCS shall be capable of simultaneous flight control of at least six Tactical AVs of the same type via LOS DLS(s) [SPS273].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	The CV based TCS shall be capable of commanding and controlling a combination of twelve LOS data links and BLOS data links simultaneously [SPS461].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	Within the operational limitations of the available data link(s), a single CV based TCS shall be capable of simultaneous control of at least twelve MMPs of different type on twelve AVs of the same type via BLOS DLS(s) [SPS311].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	Within the operational limitations of the available data link(s), a single CV based TCS shall be capable of simultaneous control of at least twelve MMPs of different type on twelve AVs of the same type via LOS DLS(s) [SPS309].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	Within the operational limitations of the available data link(s), a single CV based TCS shall be capable of simultaneous control of at least twelve MMPs of the same type on twelve AVs of the same type via BLOS DLS(s) [SPS310].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	Within the operational limitations of the available data link(s), a single CV based TCS shall be capable of simultaneous control of at least twelve MMPs of the same type on twelve AVs of the same type via LOS DLS(s) [SPS308].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	The CV based TCS shall be capable of commanding and controlling twelve BLOS data links simultaneously [SPS462].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	The CV based TCS shall be capable of simultaneous flight control of at least twelve UCAV-Ns via the BLOS DLS(s) [SPS274].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	The CV based TCS shall be capable of simultaneous flight control of at least twelve UCAV-Ns via LOS DLS(s) [SPS273].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	The CV based TCS shall be capable of controlling twelve or more UCAV-Ns simultaneously with at least five under LOS and at least five under BLOS data link control [SPS520].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	The CV based TCS shall be capable of commanding and controlling twelve LOS data links simultaneously [SPS067].	Yellow

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
TCS	Data Link	Narrowband Antennas & Standards	Within the operational limitations of the available data link(s), a single land based mobile TCS shall be capable of simultaneous control of at least six MMPs of different type on six Tactical AVs of different type via BLOS DLS(s) [SPS456].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	Within the operational limitations of the available data link(s), a single land based mobile TCS shall be capable of simultaneous control of at least six MMPs of different type on six Tactical AVs of different type via LOS DLS(s) [SPS454].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	Within the operational limitations of the available data link(s), a single land based mobile TCS shall be capable of simultaneous control of at least six MMPs of different type on six Tactical AVs of the same type via BLOS DLS(s) [SPS311].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	Within the operational limitations of the available data link(s), a single land based mobile TCS shall be capable of simultaneous control of at least six MMPs of different type on six Tactical AVs of the same type via LOS DLS(s) [SPS309].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	Within the operational limitations of the available data link(s), a single land based mobile TCS shall be capable of simultaneous control of at least six MMPs of the same type on six Tactical AVs of different type via BLOS DLS(s) [SPS455].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	Within the operational limitations of the available data link(s), a single land based mobile TCS shall be capable of simultaneous control of at least six MMPs of the same type on six Tactical AVs of different type via LOS DLS(s) [SPS453].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	Within the operational limitations of the available data link(s), a single land based mobile TCS shall be capable of simultaneous control of at least six MMPs of the same type on six Tactical AVs of the same type via BLOS DLS(s) [SPS310].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	Within the operational limitations of the available data link(s), a single land based mobile TCS shall be capable of simultaneous control of at least six MMPs of the same type on six Tactical AVs of the same type via LOS DLS(s) [SPS308].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	The land based mobile TCS shall be capable of commanding and controlling six BLOS data links simultaneously [SPS462].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	The land based mobile TCS shall be capable of commanding and controlling six LOS data links simultaneously [SPS067].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	The land based mobile TCS shall be capable of commanding and controlling a combination of six LOS data link and BLOS data links simultaneously [SPS461].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	Within the operational limitations of the available data link(s), a single land based transportable TCS shall be capable of simultaneous control of at least four MMPs of different type on four AVs of the same type via BLOS DLS(s) [SPS311].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	Within the operational limitations of the available data link(s), a single land based transportable TCS shall be capable of simultaneous control of at least four MMPs of different type on four AVs of the same type via LOS DLS(s) [SPS309].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	Within the operational limitations of the available data link(s), a single land based transportable TCS shall be capable of simultaneous control of at least four MMPs of the same type on four AVs of the same type via BLOS DLS(s) [SPS310].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	Within the operational limitations of the available data link(s), a single land based transportable TCS shall be capable of simultaneous control of at least four MMPs of the same type on four AVs of the same type via LOS DLS(s) [SPS308].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	The land based transportable TCS shall be capable of commanding and controlling four BLOS data links simultaneously [SPS462].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	The land based transportable TCS shall be capable of simultaneous flight control of at least four HALE AVs via the BLOS DLS(s) [SPS274].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	The land based transportable TCS shall be capable of simultaneous flight control of at least four HALE AVs via LOS DLS(s) [SPS273].	Yellow

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
TCS	Data Link	Narrowband Antennas & Standards	The land based transportable TCS shall be capable of controlling four or more HALE AVs simultaneously with at least two under LOS and at least two under BLOS data link control [SPS520].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	The land based transportable TCS shall be capable of commanding and controlling four LOS data links simultaneously [SPS067].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	The land based transportable TCS shall be capable of commanding and controlling a combination of four LOS data links and BLOS data links simultaneously [SPS461].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	The surface ship based TCS shall be capable of simultaneous flight control of at least two AVs of the same type and one AV of a different type via BLOS DLS(s) [SPS274].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	The surface ship based TCS shall be capable of controlling three or more AVs simultaneously with at least one under LOS and at least one under BLOS data link control [SPS520].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	The surface ship based TCS shall be capable of simultaneous flight control of at least two AVs of the same type and one AV of a different type via LOS DLS(s) [compare to SPS273 and SPS275].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	Within the operational limitations of the available data link(s), a single surface ship based TCS shall be capable of simultaneous control of at least three MMPs of different type on three AVs of different type via BLOS DLS(s) [SPS456].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	Within the operational limitations of the available data link(s), a single surface ship based TCS shall be capable of simultaneous control of at least three MMPs of different type on three AVs of different type via LOS DLS(s) [SPS454].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	Within the operational limitations of the available data link(s), a single surface ship based TCS shall be capable of simultaneous control of at least three MMPs of different type on three AVs of the same type via BLOS DLS(s) [SPS311].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	Within the operational limitations of the available data link(s), a single surface ship based TCS shall be capable of simultaneous control of at least three MMPs of different type on three AVs of the same type via LOS DLS(s) [SPS309].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	Within the operational limitations of the available data link(s), a single surface ship based TCS shall be capable of simultaneous control of at least three MMPs of the same type on three AVs of different type via BLOS DLS(s) [SPS455].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	Within the operational limitations of the available data link(s), a single surface ship based TCS shall be capable of simultaneous control of at least three MMPs of the same type on three AVs of different type via LOS DLS(s) [SPS453].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	Within the operational limitations of the available data link(s), a single surface ship based TCS shall be capable of simultaneous control of at least three MMPs of the same type on three AVs of the same type via BLOS DLS(s) [SPS310].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	Within the operational limitations of the available data link(s), a single surface ship based TCS shall be capable of simultaneous control of at least three MMPs of the same type on three AVs of the same type via LOS DLS(s) [SPS308].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	The surface ship based TCS shall be capable of commanding and controlling three BLOS data links simultaneously [SPS462].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	The surface ship based TCS shall be capable of commanding and controlling three LOS data links simultaneously [SPS067].	Yellow
TCS	Data Link	Narrowband Antennas & Standards	The surface ship based TCS shall be capable of commanding and controlling a combination of three LOS data link and BLOS data links simultaneously [SPS461].	Yellow
HALE	Data Link	Standards	The HALE Vehicle shall have sufficient autonomy such that it can be controlled by the CV control station simultaneously with 12 UCAVs and two other HALE UAVs including each vehicle's payload. The HALE Vehicle shall also have sufficient autonomy such that it can be controlled by the LHA control station simultaneously with X Tactical UAVs and X other HALE UAVs including each vehicle's payload. [LHA numbers not provided in OCD. Requires analysis of OCD to determine maximum number necessary to perform as documented.]	Red

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
HALE	Data Link	Standards	The HALE UAV shall have a primary data link capable of providing the TCS with all radar images, radar track data, ESM data, SIGINT data, NBC detection data, vehicle control and health information as well as all EO/IR imagery.	Red
HALE	Data Link	Standards	The HALE UAV shall have a SATCOM data link capable of Level 4 control including all radar images, radar track data, SIGINT data, NBC detection data, vehicle control and health information as well as all EO/IR imagery at an image rate equivalent to the radar imagery rate for all valid payload combinations.	Red
HALE	Data Link	Standards	The HALE UAV shall have a primary data link capable of Level 4 control including all radar images, radar track data, ESM data, SIGINT data, NBC detection data, vehicle control and health information as well as all EO/IR imagery at an image rate equivalent to the radar imagery rate for all valid payload combinations at a range of 300 nm at a combined maximum rate of 45 MBS. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time.	Red
Tactical 2	Data Link	Standards	The Tactical Tier 2 UAV shall have a primary data link capable of providing the submarine TCS with previously recorded radar images, radar track data, ESM data, SIGINT data, NBC detection data, vehicle control and health information as well as all EO/IR imagery at a rate of 45 MB/S. [Since the system will have the ability to record and download to sub later as part of cover nature, the necessity to service multiple UAVs will be mitigated. This requirement is driven by the submarine launched UAV elements of the OCD.]	Red
Tactical 2	Data Link	Standards	The Tactical Tier 2 UAV shall have a primary data link capable of sending and receiving all radar images, radar track data, ESM data, SIGINT data, NBC detection data, vehicle control and health information as well as all EO/IR imagery at an image rate equivalent to the radar imagery rate for all valid payload combinations at a range of 150 nm at a combined maximum rate of 45 MBS. The data shall be moved to the TCS over a time shared Data Link available for not more than 1/X of the time. [Assumes 1 antenna on ship or on beach dedicated to the Tactical Tier 2 UAV. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of UAVs that must be supported in most stressing scenario needs further analysis.]	Red
Tactical 3	Data Link	Standards	The Tactical Tier 3 UAV shall have a wideband data link capable of sending and receiving all radar images, radar track data, ESM data, SIGINT data, NBC detection data, vehicle control and health information as well as all EO/IR imagery or all valid payload combinations at a range of 150 nm at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than 1/X of the time. [Assumes 1 antenna on ship or on beach dedicated to the Tactical Tier 2 UAV. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of UAVs that must be supported in most stressing scenario needs further analysis.]	Red
UCAV-N	Data Link	Standards	The UCAV-N shall have sufficient autonomy such that it can be controlled by the CV control station simultaneously with 11 other UCAVs and three HALE UAVs including each vehicle's payload.	Red
UCAV-N	Data Link	Standards	The UCAV-N shall have a wideband data link capable of including all ESM data, SIGINT data, NBC detection data, vehicle control and health information as well as all EO/IR imagery at an image reate equivalent to the radar imagery rate for all valid payload combinations at a range of 250 nm at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time. [For the range $1.23 * \sqrt{45,000\text{ft}}$ = approx 250nm. As far as one third... There can be as many as 12 UCAVs airborne at once. This is not a reasonable number to timeshare the one shipboard antenna or the one HALE relay package. The scenarios indicate that the UCAVs are only collecting imagery and other data over short periods of their flights. Here we make the assumption that the one third requirement is the same as the HALE UAV time share and that we will manage the 12 UCAVs data streams such that no single UAV requires more than one third and most require much less. Needs more description and analysis.]	Red

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
HALE	Data Link	Standards	The HALE UAV communication relay package shall be able to simultaneously relay the narrowband C2, status and voice communication for up to twelve other UAVs with a maximum UAV to HALE range of 250 nm and a HALE to ship maximum range of 300nm. [Most stressing is CV with 3 HALE and 12 UCAVs. Assume one of the three HALEs provide relay to the 12 UCAVs with HALE LOS based on 60,000 ft and UCAV LOS at 45,000 ft.]	Yellow
HALE	Data Link	Standards	The HALE EO-IR subsystem shall transfer imagery to a TCS in combination with a multi-mode radar and ESM payload at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time.	Yellow
HALE	Data Link	Standards	The HALE ESM subsystem shall transfer data to a TCS in combination with a multi-mode radar and EO/IR payload at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time.	Yellow
HALE	Data Link	Standards	The HALE UAV shall have a primary data link capable of exchanging C2, status and payload information with the shore based TCS facility concurrently with three other HALE UAVs.	Yellow
HALE	Data Link	Standards	The HALE UAV shall have a primary data link capable of providing C2, status and payload information to a Line-of-Sight (LOS) TCS and to a Beyond LOS (BLOS) TCS using a HALE UAV as a relay.	Yellow
HALE	Data Link	Standards	The HALE UAV primary data link shall be able to provide C2, status and payload information to a TCS at a distance of 600 nm using another HALE UAV as a relay.	Yellow
Tactical 2	Data Link	Standards	The Tactical Tier 2 EO-IR subsystem shall transmit imagery to a TCS in combination with all other onboard payloads at a rate not to excee 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than 1/X of the time. [Assumes 1 antenna on ship or on beach dedicated to the Tactical Tier 2 UAV. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of UAVs that must be supported in most stressing scenario needs further analysis.]	Yellow
Tactical 2	Data Link	Standards	The Tactical Tier 2 ESM subsystem shall transmit imagery to a TCS in combination with all other onboard payloads at a rate not to excee 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than 1/X of the time. [Assumes 1 antenna on ship or on beach dedicated to the Tactical Tier 2 UAV. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of Tactical Tier 2's that must be supported in most stressing scenario needs further analysis.]	Yellow
UCAV-N	Data Link	Standards	The UCAV-N EO-IR subsystem shall transfer imagery to a TCS in combination with all valid UCAV payload combinations at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over al time shared data link available for not more than one third of the time. [There can be as many as 12 UCAVs airborne at once. This is not a reasonable number to timeshare the one shipboard antenna or the one HALE relay package. The scenarios indicate that the UCAVs are only collecting imagery and other data over short periods of their flights. Here we make the assumption that the one third requirement is the same as the HALE UAV time share and that we will manage the 12 UCAVs data streams such that no single UAV requires more than one third and most require much less. Needs more description and analysis.]	Yellow
UCAV-N	Data Link	Standards	The UCAV-N ESM subsystem shall transfer data to a TCS in combination with all valid payload mixtures at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time. [There can be as many as 12 UCAVs airborne at once. This is not a reasonable number to timeshare the one shipboard antenna or the one HALE relay package. The scenarios indicate that the UCAVs are only collecting imagery and other data over short periods of their flights. Here we make the assumption that the one third requirement is the same as the HALE UAV time share and that we will manage the 12 UCAVs data streams such that no single UAV requires more than one third and most require much less. Needs more description and analysis.]	Yellow

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
UCAV-N	Data Link	Standards	The UCAV-N multi-mode radar subsystem shall transfer imagery to a TCS in combination with all valid UCAV payload combinations at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time. [There can be as many as 12 UCAVs airborne at once. This is not a reasonable number to timeshare the one shipboard antenna or the one HALE relay package. The scenarios indicate that the UCAVs are only collecting imagery and other data over short periods of their flights. Here we make the assumption that the one third requirement is the same as the HALE UAV time share and that we will manage the 12 UCAVs data streams such that no single UAV requires more than one third and most require much less. Needs more description and analysis.]	Yellow
UCAV-N	Data Link	Standards	The NBC detection system shall provide transfer data to the TCS in combination with all other payloads at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a single time shared data link available for not more than one third of the time. [There can be as many as 12 UCAVs airborne at once. This is not a reasonable number to timeshare the one shipboard antenna or the one HALE relay package. The scenarios indicate that the UCAVs are only collecting imagery and other data over short periods of their flights. Here we make the assumption that the one third requirement is the same as the HALE UAV time share and that we will manage the 12 UCAVs data streams such that no single UAV requires more than one third and most require much less. Needs more description and analysis.]	Yellow
HALE	Data Link	Wideband	The HALE IRST system shall collect and send to ground station IR data in conjunction with multiple HALE vehicles to enable fused 3D targeting quality TBM tracks at theater-wide ranges.	Red
HALE	Data Link	Wideband	The HALE Vehicle shall have sufficient autonomy such that it can be controlled by the CV control station simultaneously with 12 UCAVs and two other HALE UAVs including each vehicle's payload. The HALE Vehicle shall also have sufficient autonomy such that it can be controlled by the LHA control station simultaneously with X Tactical UAVs and X other HALE UAVs including each vehicle's payload. [LHA numbers not provided in OCD. Requires analysis of OCD to determine maximum number necessary to perform as documented.]	Red
HALE	Data Link	Wideband	The HALE UAV shall have a primary data link capable of providing the TCS with all radar images, radar track data, ESM data, SIGINT data, NBC detection data, vehicle control and health information as well as all EO/IR imagery.	Red
HALE	Data Link	Wideband	The HALE UAV shall have a SATCOM data link capable of Level 4 control including all radar images, radar track data, SIGINT data, NBC detection data, vehicle control and health information as well as all EO/IR imagery at an image rate equivalent to the radar imagery rate for all valid payload combinations.	Red
HALE	Data Link	Wideband	The HALE UAV shall have a primary data link capable of Level 4 control including all radar images, radar track data, ESM data, SIGINT data, NBC detection data, vehicle control and health information as well as all EO/IR imagery at an image rate equivalent to the radar imagery rate for all valid payload combinations at a range of 300 nm at a combined maximum rate of 45 MBS. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time.	Red
Tactical 2	Data Link	Wideband	The Tactical Tier 2 UAV shall have a primary data link capable of providing the submarine TCS with previously recorded radar images, radar track data, ESM data, SIGINT data, NBC detection data, vehicle control and health information as well as all EO/IR imagery at a rate of 45 MB/S. [Since the system will have the ability to record and download to sub later as part of cover nature, the necessity to service multiple UAVs will be mitigated. This requirement is driven by the submarine launched UAV elements of the OCD.]	Red

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
Tactical 2	Data Link	Wideband	The Tactical Tier 2 UAV shall have a primary data link capable of sending and receiving all radar images, radar track data, ESM data, SIGINT data, NBC detection data, vehicle control and health information as well as all EO/IR imagery at an image rate equivalent to the radar imagery rate for all valid payload combinations at a range of 150 nm at a combined maximum rate of 45 MBS . The data shall be moved to the TCS over a time shared Data Link available for not more than 1/X of the time. [Assumes 1 antenna on ship or on beach dedicated to the Tactical Tier 2 UAV. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of UAVs that must be supported in most stressing scenario needs further analysis.]	Red
Tactical 3	Data Link	Wideband	The Tactical Tier 3 UAV shall have a wideband data link capable of sending and receiving all radar images, radar track data, ESM data, SIGINT data, NBC detection data, vehicle control and health information as well as all EO/IR imagery or all valid payload combinations at a range of 150 nm at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than 1/X of the time. [Assumes 1 antenna on ship or on beach dedicated to the Tactical Tier 2 UAV. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of UAVs that must be supported in most stressing scenario needs further analysis.]	Red
Tactical 3	Data Link	Wideband	The Tactical Tier 3 vehicle shall be able to exchange all vehicle health and control information using the wideband data link while it simultaneously exchanging all payload data at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than 1/X of the time. [Assumes 1 antenna on ship or on beach dedicated to the UAVs. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of UAVs that must be supported in most stressing scenario needs further analysis.]	Red
UCAV-N	Data Link	Wideband	The UCAV-N shall have sufficient autonomy such that it can be controlled by the CV control station simultaneously with 11 other UCAVs and three HALE UAVs including each vehicle's payload.	Red
UCAV-N	Data Link	Wideband	The UCAV-N shall have a wideband data link capable of including all ESM data, SIGINT data, NBC detection data, vehicle control and health information as well as all EO/IR imagery at an image rate equivalent to the radar imagery rate for all valid payload combinations at a range of 250 nm at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time. [For the range $1.23 * \sqrt{45,000\text{ft}}$ = approx 250nm. As far as one third... There can be as many as 12 UCAVs airborne at once. This is not a reasonable number to timeshare the one shipboard antenna or the one HALE relay package. The scenarios indicate that the UCAVs are only collecting imagery and other data over short periods of their flights. Here we make the assumption that the one third requirement is the same as the HALE UAV time share and that we will manage the 12 UCAVs data streams such that no single UAV requires more than one third and most require much less. Needs more description and analysis.]	Red
UCAV-N	Data Link	Wideband	The UCAV-N wideband data link shall be able to communicate to the TCS via a relay through the HALE UAV located at least 250 nm away. [Range gased upon $1.23 * \sqrt{45,000\text{ft}}$ = approx 250nm]	Red
HALE	Data Link	Wideband	The HALE UAV communication relay package shall be able to sequentially relay wideband sensor data from multiple UAVs. The time to switch between UAVs shall be less than X.X seconds.	Yellow
HALE	Data Link	Wideband	The HALE EO-IR subsystem shall transfer imagery to a TCS in combination with a multi-mode radar and ESM payload at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time.	Yellow

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
HALE	Data Link	Wideband	The HALE ESM subsystem shall transfer data to a TCS in combination with a multi-mode radar and EO/IR payload at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time.	Yellow
HALE	Data Link	Wideband	The HALE Multi-Mode Radar shall transfer data to a TCS in combination with an EO/IR and ESM payload at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time.	Yellow
HALE	Data Link	Wideband	The HALE UAV shall have a primary data link capable of exchanging C2, status and payload information with the shore based TCS facility concurrently with three other HALE UAVs.	Yellow
HALE	Data Link	Wideband	The HALE UAV shall have a primary data link capable of providing C2, status and payload information to a Line-of-Sight (LOS) TCS and to a Beyond LOS (BLOS) TCS using a HALE UAV as a relay.	Yellow
HALE	Data Link	Wideband	The HALE UAV primary data link shall be able to provide C2, status and payload information to a TCS at a distance of 600 nm using another HALE UAV as a relay.	Yellow
Tactical 2	Data Link	Wideband	The Tactical Tier 2 EO-IR subsystem shall transmit imagery to a TCS in combination with all other onboard payloads at a rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than 1/X of the time. [Assumes 1 antenna on ship or on beach dedicated to the Tactical Tier 2 UAV. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of UAVs that must be supported in most stressing scenario needs further analysis.]	Yellow
Tactical 2	Data Link	Wideband	The Tactical Tier 2 ESM subsystem shall transmit imagery to a TCS in combination with all other onboard payloads at a rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than 1/X of the time. [Assumes 1 antenna on ship or on beach dedicated to the Tactical Tier 2 UAV. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of Tactical Tier 2's that must be supported in most stressing scenario needs further analysis.]	Yellow
Tactical 2	Data Link	Wideband	The Tactical Tier 2 UAV shall have a primary data link capable of covertly exchanging C2 information and downloading selected payload data.	Yellow
Tactical 2	Data Link	Wideband	The Tactical Tier 2 UAV shall have a primary data link capable of simultaneously transmitting level 2 payload data to amphibious ships while under control of Naval landing craft and forces ashore.	Yellow
Tactical 2	Data Link	Wideband	The Tactical Tier 2 UAV primary data link shall be able to provide C2, status and payload information to a TCS at a distance of 450 nm using a HALE UAV as a relay. [Based upon 300 nm from TCS to HALE and 150 nm from Tactical Tier 2 to HALE. 150 nm is based upon $1.23 \times \sqrt{15,000 \text{ ft}}$.]	Yellow
Tactical 3	Data Link	Wideband	The Tactical Tier 3 EO-IR subsystem shall transfer imagery to a TCS in combination with all other installed payloads at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than 1/3 of the time. [Assumes 1 antenna on ship or on beach dedicated to the Tactical Tier 2 UAV. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of UAVs that must be supported in most stressing scenario needs further analysis.]	Yellow
Tactical 3	Data Link	Wideband	The Tactical Tier 3 ESM subsystem shall transfer data to the TCS in combination with the EO/IR payload at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than 1/X of the time. [Assumes 1 antenna on ship or on beach dedicated to the Tactical Tier 2 UAV. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of UAVs that must be supported in most stressing scenario needs further analysis.]	Yellow

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
Tactical 3	Data Link	Wideband	The Tactical Tier 3 multi-mode radar subsystem shall transfer data to the TCS in combination with all valid payload combinations at a combined maximum rate not to exceed 45 Mbps. The data shall be moved to the TCS over a time shared data link available for not more than 1/3 of the time. [Assumes 1 antenna on ship or on beach dedicated to the Tactical Tier 2 UAV. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of UAVs that must be supported in most stressing scenario needs further analysis.]	Yellow
Tactical 3	Data Link	Wideband	The Tactical Tier 3 UAV shall have a Primary Data Link suitable for the exchange of C2 and payload data with TCS equipped surface ships up to level 5.	Yellow
Tactical 3	Data Link	Wideband	The Tactical Tier 3 UAV primary data link shall be able to provide C2, status and payload information to a TCS at a distance of 450 nm using a HALE UAV as a relay. [Range based upon LOS from TCS to HALE and the Tactical Tier 3 LOS range based upon $1.23 \times \sqrt{15,000}$ ft]	Yellow
Tactical 3	Data Link	Wideband	The Tactical Tier 3 UAV shall have a primary data link capable of performing self diagnostics and link checks as part of a total 15 minute diagnostic period. [Allocated from aircraft prep, brief, preflight, TCS manup flow.]	Yellow
UCAV-N	Data Link	Wideband	The UCAV-N EO-IR subsystem shall transfer imagery to a TCS in combination with all valid UCAV payload combinations at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time. [There can be as many as 12 UCAVs airborne at once. This is not a reasonable number to timeshare the one shipboard antenna or the one HALE relay package. The scenarios indicate that the UCAVs are only collecting imagery and other data over short periods of their flights. Here we make the assumption that the one third requirement is the same as the HALE UAV time share and that we will manage the 12 UCAVs data streams such that no single UAV requires more than one third and most require much less. Needs more description and analysis.]	Yellow
UCAV-N	Data Link	Wideband	The UCAV-N ESM subsystem shall transfer data to a TCS in combination with all valid payload mixtures at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time. [There can be as many as 12 UCAVs airborne at once. This is not a reasonable number to timeshare the one shipboard antenna or the one HALE relay package. The scenarios indicate that the UCAVs are only collecting imagery and other data over short periods of their flights. Here we make the assumption that the one third requirement is the same as the HALE UAV time share and that we will manage the 12 UCAVs data streams such that no single UAV requires more than one third and most require much less. Needs more description and analysis.]	Yellow
UCAV-N	Data Link	Wideband	The UCAV-N multi-mode radar subsystem shall transfer imagery to a TCS in combination with all valid UCAV payload combinations at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time. [There can be as many as 12 UCAVs airborne at once. This is not a reasonable number to timeshare the one shipboard antenna or the one HALE relay package. The scenarios indicate that the UCAVs are only collecting imagery and other data over short periods of their flights. Here we make the assumption that the one third requirement is the same as the HALE UAV time share and that we will manage the 12 UCAVs data streams such that no single UAV requires more than one third and most require much less. Needs more description and analysis.]	Yellow

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
UCAV-N	Data Link	Wideband	The NBC detection system shall provide transfer data to the TCS in combination with all other payloads at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a single time shared data link available for not more than one third of the time. [There can be as many as 12 UCAVs airborne at once. This is not a reasonable number to timeshare the one shipboard antenna or the one HALE relay package. The scenarios indicate that the UCAVs are only collecting imagery and other data over short periods of their flights. Here we make the assumption that the one third requirement is the same as the HALE UAV time share and that we will manage the 12 UCAVs data streams such that no single UAV requires more than one third and most require much less. Needs more description and analysis.]	Yellow
TCS	HCI		During mission execution, the TCS shall support the display of the emergency procedures if the system is experiencing an emergency/unsafe condition or is executing a potentially unsafe maneuver such as [XXXXXXX]. The TCS shall provide a caution/warning to the operator when the UAV system has identified a malfunction.	Yellow
TCS	IT Design Standards		The TCS shall comply with NMCI and IT-21 standards.	Yellow
TCS	IT Design Standards		The TCS shall be an open system architecture as defined by the DoD Open Systems Joint Task Force. The TCS shall have non-proprietary interfaces between modules, such that new or upgraded functionality can be incorporated throughout the system's life cycle. [should have commercial interfaces]	Yellow
TCS	MMP Control		Within the operational limitations of the available data link(s), a single CV based TCS shall be capable of simultaneous control of at least twelve MMPs of different type on twelve AVs of the same type via BLOS DLS(s) [SPS311].	Red
TCS	MMP Control		Within the operational limitations of the available data link(s), a single CV based TCS shall be capable of simultaneous control of at least twelve MMPs of different type on twelve AVs of the same type via LOS DLS(s) [SPS309].	Red
TCS	MMP Control		Within the operational limitations of the available data link(s), a single CV based TCS shall be capable of simultaneous control of at least twelve MMPs of the same type on twelve AVs of the same type via BLOS DLS(s) [SPS310].	Red
TCS	MMP Control		Within the operational limitations of the available data link(s), a single CV based TCS shall be capable of simultaneous control of at least twelve MMPs of the same type on twelve AVs of the same type via LOS DLS(s) [SPS308].	Red
TCS	MMP Control		The UCAV-N shall be capable of establishing or using second party GPS, laser, IR pointer, etc for attacking both stationary and mobile TBM launchers.	Red
TCS	MMP Control		Within the operational limitations of the available data link(s), a single land based mobile TCS shall be capable of simultaneous control of at least six MMPs of different type on six Tactical AVs of different type via BLOS DLS(s) [SPS456].	Red
TCS	MMP Control		Within the operational limitations of the available data link(s), a single land based mobile TCS shall be capable of simultaneous control of at least six MMPs of different type on six Tactical AVs of different type via LOS DLS(s) [SPS454].	Red
TCS	MMP Control		Within the operational limitations of the available data link(s), a single land based mobile TCS shall be capable of simultaneous control of at least six MMPs of different type on six Tactical AVs of the same type via BLOS DLS(s) [SPS311].	Red
TCS	MMP Control		Within the operational limitations of the available data link(s), a single land based mobile TCS shall be capable of simultaneous control of at least six MMPs of different type on six Tactical AVs of the same type via LOS DLS(s) [SPS309].	Red
TCS	MMP Control		Within the operational limitations of the available data link(s), a single land based mobile TCS shall be capable of simultaneous control of at least six MMPs of the same type on six Tactical AVs of the same type via BLOS DLS(s) [SPS310].	Red
TCS	MMP Control		Within the operational limitations of the available data link(s), a single land based mobile TCS shall be capable of simultaneous control of at least six MMPs of the same type on six Tactical AVs of the same type via LOS DLS(s) [SPS308].	Red

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
TCS	MMP Control		Within the operational limitations of the available data link(s), a single land based mobile TCS shall be capable of simultaneous control of at least six MMPs of the same type on six Tactical AVs of different type via BLOS DLS(s) [SPS455].	Red
TCS	MMP Control		Within the operational limitations of the available data link(s), a single land based mobile TCS shall be capable of simultaneous control of at least six MMPs of the same type on six Tactical AVs of different type via LOS DLS(s) [SPS453].	Red
TCS	MMP Control		Within the operational limitations of the available data link(s), a single land based transportable TCS shall be capable of simultaneous control of at least four MMPs of different type on four AVs of the same type via BLOS DLS(s) [SPS311].	Red
TCS	MMP Control		Within the operational limitations of the available data link(s), a single land based transportable TCS shall be capable of simultaneous control of at least four MMPs of different type on four AVs of the same type via LOS DLS(s) [SPS309].	Red
TCS	MMP Control		Within the operational limitations of the available data link(s), a single land based transportable TCS shall be capable of simultaneous control of at least four MMPs of the same type on four AVs of the same type via LOS DLS(s) [SPS308].	Red
TCS	MMP Control		Within the operational limitations of the available data link(s), a single land based transportable TCS shall be capable of simultaneous control of at least four MMPs of the same type on four AVs of the same type via BLOS DLS(s) [SPS310].	Red
TCS	MMP Control		The TCS shall be capable of recognizing, differentiating and assigning weapons based on data supplied by the Tactical Tier 3 UAV.	Red
TCS	MMP Control		The UCAV-N Weapons System payload shall be semi-autonomous to the extent that the attention and intervention of a crew's two payload operators can be shared with other payloads on the same and other air vehicles.	Red
TCS	MMP Control		Within the operational limitations of the available data link(s), a single surface ship based TCS shall be capable of simultaneous control of at least three MMPs of different type on three AVs of different type via BLOS DLS(s) [SPS456].	Red
TCS	MMP Control		Within the operational limitations of the available data link(s), a single surface ship based TCS shall be capable of simultaneous control of at least three MMPs of different type on three AVs of different type via LOS DLS(s) [SPS454].	Red
TCS	MMP Control		Within the operational limitations of the available data link(s), a single surface ship based TCS shall be capable of simultaneous control of at least three MMPs of different type on three AVs of the same type via BLOS DLS(s) [SPS311].	Red
TCS	MMP Control		Within the operational limitations of the available data link(s), a single surface ship based TCS shall be capable of simultaneous control of at least three MMPs of different type on three AVs of the same type via LOS DLS(s) [SPS309].	Red
TCS	MMP Control		Within the operational limitations of the available data link(s), a single surface ship based TCS shall be capable of simultaneous control of at least three MMPs of the same type on three AVs of different type via BLOS DLS(s) [SPS455].	Red
TCS	MMP Control		Within the operational limitations of the available data link(s), a single surface ship based TCS shall be capable of simultaneous control of at least three MMPs of the same type on three AVs of different type via LOS DLS(s) [SPS453].	Red
TCS	MMP Control		Within the operational limitations of the available data link(s), a single surface ship based TCS shall be capable of simultaneous control of at least three MMPs of the same type on three AVs of the same type via BLOS DLS(s) [SPS310].	Red
TCS	MMP Control		Within the operational limitations of the available data link(s), a single surface ship based TCS shall be capable of simultaneous control of at least three MMPs of the same type on three AVs of the same type via LOS DLS(s) [SPS308].	Red
TCS	MMP Control		The TCS shall support the launch and selection of fuse detonation commands for selected munitions.	Yellow
TCS	MMP Control		The TCS shall include the capability to provide terminal homing commands to the Tactical Tier 3 UAV for weapons release.	Yellow

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
TCS	MMP Control		The TCS shall have the capability to communicate with UAVs beyond line of sight using communications relay package on board the HALE UAV at a maximum range at least equal to twice the maximum line of sight distance to the relay HALE UAV .	Yellow
TCS	MMP Control		The land based mobile TCS shall provide the capability to command and control the HAE UAV across the five levels of interaction [SPS336]	Yellow
TCS	MMP Control		The man portable TCS shall provide the capability to command and control future tactical and MAE UAVs across the first four levels of interaction [SPS261, compare with SPS004, SPS005, SPS006, SPS007, SPS008, and SPS259].	Yellow
TCS	MMP Control		The MMA based TCS shall be capable of handing-off control of a MMP from one TCS to another TCS or TCS-compliant GCS [SPS316].	Yellow
TCS	MMP Control		The MMA based TCS shall be able to receive control of a MMP via hand-off from another TCS [SPS320].	Yellow
TCS	MMP Control		Within the operational limitations of the available data link(s), a single TCS shall be capable of controlling the MMP(s) on an AV controlled by a different TCS or TCS-compliant GCS during mission execution (i.e., Level 3 Interaction - see SPS006).	Yellow
TCS	MMP Control		The surface ship based TCS shall have sufficient automation to enable up to level 3 control of 1 HALE UAV with one operator.	Yellow
TCS	MMP Control		The submarine based TCS shall be capable of handing-off control of a MMP from one TCS to another TCS or TCS-compliant GCS [SPS316].	Yellow
TCS	MMP Control		The submarine based TCS shall be able to receive control of a MMP via hand-off from another TCS [SPS320].	Yellow
TCS	MMP Control		The TCS shall support the targeting of multiple objects by a UCAV-N.	Yellow
TCS	MMP Control		The TCS shall accommodate synchronized receipt of radar images, radar track data, ESM data, SIGINT data, NBC detection data, vehicle control and health information as well as all EO/IR imagery from single or multiple UAVs.	Yellow
TCS	MMP Control		The TCS shall include the capability to provide mid course guidance commands to the UAV weapons systems for select weapons released from the air vehicle.	Yellow
TCS	MMP Control		The TCS shall incorporate a data base of all known targets to be used to compare UAV supplied data to to aide in target identification.	Yellow
Tactical 2	Non Technology Issue	Design	Tactical Tier 2 UAV shall have the capability to be launched from a submarine.	Red
UCAV-N	Non Technology Issue	Design	UCAV-N Air Vehicle shall be servicable using the same shore facilities and equipment as manned fighters	Yellow
UCAV-N	Non Technology Issue	Maintenance	The laser designator payload shall be modular and configurable with combinations of the other UCAV-N payloads. It shall be serviceable and removable without impacting the integration of other payload packages.	Yellow
UCAV-N	Non Technology Issue	Maintenance	The UCAV-N NBC detection payload shall be modular and configurable with combinations of the other UCAV-N payloads. It shall be serviceable and removable without impacting the integration of other payload packages.	Yellow
UCAV-N	Non Technology Issue	Maintenance	UCAV-N Air Vehicle shall be servicable using the same shore facilities and equipment as manned fighters	Yellow
UCAV-N	Non Technology Issue	Maintenance	The UCAV-N weapons shall be useable in combination with other payloads. They shall be serviceable, installable and removable without impacting the integration of other payload packages.	Yellow
UCAV-N	Non Technology Issue	Operations	UCAV-N shall be able to operate in conjunction with manned ashore operations without disrupting the operation of the manned vehicles.	Red
HALE	Payload	Comm Relay	The HALE Comm Relay package shall be modular to the extent that a maintenance crew can remove or install it within a timeline that facilitates all other mission preparations starting no earlier than 22 hours prior to launch.	Red
HALE	Payload	Comm Relay	The HALE Comm. Relay Package shall be modular and part of a complete payload including:Multi-mode radar, EO-IR, SIGINT including ELINT & COMINT, Communication Relay.	Red
Tactical 3	Payload	Comm Relay	The Tactical Tier 3 Communications Relay subsystem shall be modular and part of a reconfigurable payload including EO/IR.	Red

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
HALE	Payload	Comm Relay	The HALE UAV communication relay package shall be able to simultaneously relay the narrowband C2, status and voice communication for up to twelve other UAVs with a maximum UAV to HALE range of 250 nm and a HALE to ship maximum range of 300nm. [Most stressing is CV with 3 HALE and 12 UCAVs. Assume one of the three HALEs provide relay to the 12 UCAVs with HALE LOS based on 60,000 ft and UCAV LOS at 45,000 ft.]	Yellow
HALE	Payload	Comm Relay	The HALE UAV communication relay package shall be able to relay a peak wideband load of 45 MB/S duplexed.	Yellow
HALE	Payload	Comm Relay	The HALE UAV communication relay payload shall be able to relay to/from special forces on the ground at XX nm and to/from a ship at 300 nm. The communication relay payload shall be able to relay UHF, VHF, Link-16 and CDL voice and data. The uplink from the special forces ground station to the HALE UAV shall be covert.	Yellow
HALE	Payload	Comm Relay	The HALE UAV communication relay package shall be able to sequentially relay wideband sensor data from multiple UAVs. The time to switch between UAVs shall be less than X.X seconds.	Yellow
HALE	Payload	Comm Relay	The HALE UAV communication relay package shall be able to receive and transmit wide and narrow band data to a maximum range of 300 nm each way for HALE to HALE relay or a total distance of 600 nm. for other UAVs the total relay distance shall equal 300 nm plus the RF line of sight for the relayed UAV.	Yellow
Tactical 3	Payload	Comm Relay	The HALE Comm. Relay Package shall have Combat Search and Rescue (CSAR) capable radios to communicate with downed airmen.	Yellow
Tactical 3	Payload	Comm Relay	The Tactical Tier 3 Comm. Relay Package shall have VHF and UHF capable radios with direction finding capability to locate downed airman radio signals.	Yellow
HALE	Payload	EO/IR	The HALE EO-IR payload shall operate in an unpressurized environment throughout the operational envelope of the HALE UAV platform. The system shall be capable of producing imagery of the quality listed in the subsequent sections at a range of XX nm beyond the threat envelope of an SA XX surface to air missile, or a total range of XXX nm. The EO-IR sensor shall be capable of wide area and spot sized area target surveillance. The sensor shall have multi-spectral detectivity over the entire sensor array field of view. Changes between wide area and narrow field of view shall be performed using variable focal length optics to provide a smooth pan-in and pan-out capability to the payload operator. Additionally, for autonomous HALE UAV operation, the sensor shall have provisions for preset field of views, depending on own ship altitude and slant range.	Red
HALE	Payload	EO/IR	The HALE EO/IR payload shall be capable of templating/ATR techniques to support the identification of surface combatants, surfaced submarines and commercial vessels in blue water and littorals at ranges of XXX nm beyond the threat envelop of an SA XX and SAN XX surface to air missile which is a total of XXX nm.	Red
HALE	Payload	EO/IR	The HALE EO/IR sensor shall be capable of accepting external cues and slewing to the appropriate location for supporting the identification of surface targets. The system shall provide image clips anotated with appropriate track numbers provided by external cue. The system shall support this function at XX nm beyond the threat envelope of an SA XX and SAN XX surface to air missile which is a total of XXX nm.	Red
HALE	Payload	EO/IR	The HALE EO-IR sensors shall have resolution sufficient to assess enemy runway damage-Miss, Hit (Degraded), or Hit (Incapacitated) (NIIRS=x) at beyond the range of SA XX surface to air missiles or a total of XXX nm. [Same comment as 44 above.]	Red
HALE	Payload	EO/IR	The HALE EO-IR sensors shall have resolution sufficient to assess TBM impact damage-Miss, Hit (Degraded), or Hit (Incapacitated) (NIIRS=x) at the range of SA XX surface to air missiles or a total of XXX nm. [Range allows assessment up to the battle line.]	Red
HALE	Payload	EO/IR	The HALE EO-IR sensors shall have resolution sufficient to assess weapon impact damage to enemy surface ships -Miss, Hit (Degraded), or Hit (Incapacitated) (NIIRS=x) at beyond the range of SA XX or SAN XX or a total of XXX nm. [Range sufficient to close on a defended surface target and gain BDA.]	Red

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
HALE	Payload	EO/IR	The HALE EO-IR sensors shall be capable of monitoring large scale land force movements at a range of 50 nm beyond SA-XX surface to air missile range or a total of XXXnm. The EO-IR sensor payload shall have the capability of both recording and processing the movement of targets, and to be capable of identifying, through spectral, temporal, and/or spatial filtering algorithms, the presence of enemy activity and the degree of hostile intent.	Red
HALE	Payload	EO/IR	The HALE EO-IR subsystem shall have resolution sufficient to detect and track fixed and moving TBM launchers that have been detected with MMR or another means at a range of 50 nm beyond SA-XX surface to air missile range or a total of XXXnm. [Must assume that if we cannot preclude TBM launchers, we also can't preclude SAM launchers.]	Red
HALE	Payload	EO/IR	The HALE UAV EO/IR sensor shall be capable of general surveillance and planning level imagery of urban areas and cities at a range of 50 nm beyond SA-XX surface to air missile range or a total of XXXnm.	Red
HALE	Payload	EO/IR	The HALE EO-IR sensors shall have resolution sufficient to identify fixed and moving TBM launchers (NIIRS=x) at a range of at least 50 nm beyond SA XX surface to air missile range or a total of XXX nm.	Red
HALE	Payload	EO/IR	The HALE EO/IR sensor shall have resolution (NIIRS X) and onboard algorithms to support identification of moving targets on roads at standoff ranges of XXX nm which is 50 nm beyond the range of SA XX surface to air missiles.	Red
Tactical 1	Payload	EO/IR	The Tactical Tier 1 EO-IR subsystem shall have optical resolution sufficient to identify personnel to the extent that friend/foe and combatant/non-combatant status can be determined (uniform wear, weapon possession, men vs. women and children, etc.) through common urban building windows from a vehicle at ranges of XXXX feet. [See 28 above for range.]	Red
Tactical 1	Payload	EO/IR	The Tactical Tier 1 EO-IR subsystem shall have optical resolution sufficient to identify single and groups of troops to the extent that friend/foe and combatant/non-combatant status can be determined (uniform wear, weapon possession, men vs. women and children, etc.) from a vehicle at ranges of 6,000 feet in an urban environment.	Red
Tactical 1	Payload	EO/IR	The Tactical Tier 1 EO-IR subsystem shall have optical and IR resolution sufficient to identify moving and stationary vehicles to the extent that vehicle type, friend/foe, and combatant/non-combatant status can be determined (vehicle type, markings) from a vehicle at ranges of 6,000 feet in an urban environment.	Red
Tactical 1	Payload	EO/IR	The Tactical Tier 1 EO/IR subsystem shall be capable of detecting distinct human heat sources with greater than 2 feet separation between the sources in an area 50 by 50 feet at a range of XXXX feet from outside buildings through walls composed of wood, concrete or cinder block material. [Facilitates detecting humans in a house sized structure at least separated by normal conversational distance. The range will be equal to the standard rate turn radius at 60 kts plus 200 feet to facilitate maneuvering of vehicle. Need to look up the equation.]	Red
Tactical 1	Payload	EO/IR	The Tactical Tier 1 EO-IR subsystem shall be able to detect identifying symbols on vehicles in an urban environment at ranges of at least 6,000 feet, vehicle speeds of 60 mph and UAV speed up to 60 knots.	Red
Tactical 1	Payload	EO/IR	The Tactical Tier 1 EO-IR subsystem shall have optical resolution sufficient to identify snipers on buildings and in moving vehicles at speeds up to of 60 mph at ranges of 6,000 feet with UAV speeds up to 60 knots.	Red
Tactical 1	Payload	EO/IR	The Tactical Tier 1 EO-IR subsystem shall have optical and IR resolution sufficient to surveil, detect and track vehicle and troop movement in an urban environment at ranges of 6,000 feet for maximum vehicle speeds up to 60 mph with UAV speeds up to 60 knots.	Red
Tactical 1	Payload	EO/IR	The Tactical Tier 1 EO-IR subsystem shall have optical and IR resolution sufficient to surveil, detect and track personnel through common urban building windows at ranges of XXXXX feet. [See 28 above.]	Red
Tactical 1	Payload	EO/IR	The Tactical Tier 1 EO-IR subsystem shall have optical and IR resolution sufficient to surveil, detect and track sniper gunfire from buildings and moving vehicles at speeds up to 60 mph at ranges of 6,000 feet with UAV speeds up to 60 knots. [Range to provide standoff from small arms.]	Red

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
Tactical 2	Payload	EO/IR	The Tactical Tier 2 EO-IR subsystem shall have optical and IR resolution sufficient to surveil, detect and track vehicle and troop movement in an urban environment at ranges of X nm for maximum vehicle speeds up to 60 mph with UAV speeds up to 150 knots. [X nm equal to MANPAD range against Tactical Tier 2 class to allow surveillance outside of shoulder fired SAM and small arms.]	Red
Tactical 2	Payload	EO/IR	The Tactical Tier 2 EO-IR subsystem shall have optical resolution sufficient to identify single and groups of troops to the extent that friend/foe and combatant/non-combatant status can be determined (uniform wear, weapon possession, men vs. women and children, etc.) from a vehicle at ranges of 5 nm in an urban environment. [X nm equal to MANPAD range against Tactical Tier 2 class to allow surveillance outside of shoulder fired SAM and small arms.]	Red
Tactical 3	Payload	EO/IR	The Tactical Tier 3 EO-IR subsystem shall have optical and IR resolution sufficient to surveil, detect and track small units of troops in an urban environment at ranges of 2 nm for maximum UAV speeds up to 150 knots. [X nm equal to MANPAD range against Tactical Tier 2 class to allow surveillance outside of shoulder fired SAM and small arms.]	Red
Tactical 3	Payload	EO/IR	The Tactical Tier 3 EO-IR subsystem shall have optical and IR resolution sufficient to surveil, detect and track vehicle and troop movement in an urban environment at ranges of XX nm for maximum vehicle speeds up to 60 mph with UAV speeds up to 150 knots. [Range should be sufficient to provide sanctuary from lower end mobile SAMs. Analysis required.]	Red
Tactical 3	Payload	EO/IR	The Tactical Tier 3 EO-IR subsystem shall have optical and IR resolution sufficient to surveil, detect and track fixed and moving vehicles in an urban environment at ranges of SS nm for maximum vehicle speeds up to 60 mph with UAV speeds up to 150 knots. [Range should be sufficient to provide sanctuary from lower end mobile SAMs. Analysis required.]	Red
Tactical 3	Payload	EO/IR	The Tactical Tier 3 EO-IR subsystem shall have optical resolution sufficient to identify single and groups of troops to the extent that friend/foe and combatant/non-combatant status can be determined (uniform wear, weapon possession, men vs. women and children, etc.) from a vehicle moving at 150 kts at ranges of XX nm in an urban environment. [X nm equal to MANPAD range against Tactical Tier 2 class to allow surveillance outside of shoulder fired SAM and small arms.]	Red
Tactical 3	Payload	EO/IR	The Tactical Tier 3 EO-IR subsystem shall have optical and IR resolution sufficient to perform battle damage assessment of moving and stationary vehicles from a vehicle moving at 150 kts at ranges of XX nm in an urban environment. [Range should be sufficient to provide sanctuary from lower end mobile SAMs. Analysis required.]	Red
Tactical 3	Payload	EO/IR	The Tactical Tier 3 EO-IR subsystem shall target fixed and moving vehicles to within 7 m CEP in an urban environment at ranges of XX nm for maximum vehicle speeds up to 60 mph with UAV speeds up to 150 knots. [Need accuracy sufficient for precision weapons. Range should be sufficient to provide sanctuary from lower end mobile SAMs. Analysis required.]	Red
UCAV-N	Payload	EO/IR	The UCAV-N EO/IR subsystem shall include data reduction & processing capability and capability to fuse data with data from other sensors so as to minimize data reduction, processing and fusion by limited mission control system personnel.	Red
UCAV-N	Payload	EO/IR	The UCAV-N EO/IR subsystem shall have optical and IR resolution sufficient to attack fixed and moving TBM launchers at ranges of XX nm for maximum vehicle speeds up to 40 mph with UAV speeds up to Mach 0.9. [Range as necessary to support the weapon. Analysis required.]	Red
UCAV-N	Payload	EO/IR	The UCAV-N EO/IR system shall detect and track surface combatants, cargo ships and coastal craft in the littoral environment with sufficient optical and IR resolution to surveil, to support attacks at ranges of 100 nm, ship speeds up to 60 kts and UCAV-N speeds up to Mach 0.9. [At ASCM type ranges.]	Red
UCAV-N	Payload	EO/IR	The UCAV-N EO-IR subsystem shall have optical and IR resolution sufficient to identify small units of troops at ranges of XX nm with UAV speeds up to Mach 0.9. [Needs to be 50 nm longer than maximum range of smaller mobile SAMS against UCAV below 10Kft. Allows influence of battlefield below cloud deck where EO/IR relevant, while keeping aircraft safe from hidden, small SAMS.]	Red

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
UCAV-N	Payload	EO/IR	The UCAV-N EO-IR subsystem shall have optical and IR resolution sufficient to identify fixed and moving vehicles at ranges of 100 nm for maximum vehicle speeds up to 60 mph with UAV speeds up to Mach 0.9. [EO/IR attacks limited by cloud deck. Assume a 10Kft nominal altitude with reasonable grazing angle. Maximum detectable range thus around 100nm.]	Red
UCAV-N	Payload	EO/IR	The UCAV-N EO-IR subsystem shall have optical and IR resolution sufficient to perform battle damage assessment of small units of troops at ranges of XX nm with UAV speeds up to Mach 0.9. [Needs to be 50 nm longer than maximum range of smaller mobile SAMS against UCAV below 10Kft. Allows influence of battlefield below cloud deck where EO/IR relevant, while keeping aircraft safe from hidden, small SAMS.]	Red
UCAV-N	Payload	EO/IR	The UCAV-N EO-IR subsystem shall have optical and IR resolution sufficient to perform battle damage assessment of fixed and moving vehicles at ranges of 100 nm for maximum vehicle speeds up to 60 mph with UAV speeds up to Mach 0.9. [EO/IR attacks limited by cloud deck. Assume a 10Kft nominal altitude with reasonable grazing angle. Maximum detectable range thus around 100nm.]	Red
UCAV-N	Payload	EO/IR	The UCAV-N EO-IR subsystem shall have optical and IR resolution sufficient to surveil, detect and track small units of troops at ranges of XX nm with UAV speeds up to Mach 0.9. [Needs to be 50 nm longer than maximum range of smaller mobile SAMS against UCAV below 10Kft. Allows influence of battlefield below cloud deck where EO/IR relevant, while keeping aircraft safe from hidden, small SAMS.]	Red
UCAV-N	Payload	EO/IR	The UCAV-N EO-IR subsystem shall have optical and IR resolution sufficient to surveil, detect and track fixed and moving vehicles at ranges of 100 nm for maximum vehicle speeds up to 60 mph with UAV speeds up to Mach 0.9. [EO/IR attacks limited by cloud deck. Assume a 10Kft nominal altitude with reasonable grazing angle. Maximum detectable range thus around 100nm.]	Red
UCAV-N	Payload	EO/IR	The UCAV-N EO-IR subsystem shall have optical and IR resolution and positioning accuracy sufficient to target small units of troops at ranges of XX nm with UAV speeds up to Mach 0.9. [Needs to be 50 nm longer than maximum range of smaller mobile SAMS against UCAV below 10Kft. Allows influence of battlefield below cloud deck where EO/IR relevant, while keeping aircraft safe from hidden, small SAMS.]	Red
UCAV-N	Payload	EO/IR	The UCAV-N EO-IR subsystem shall have optical and IR resolution and positioning accuracy sufficient to target fixed and moving vehicles at ranges of 100 nm for maximum vehicle speeds up to 60 mph with UAV speeds up to Mach 0.9. [EO/IR attacks limited by cloud deck. Assume a 10Kft nominal altitude with reasonable grazing angle. Maximum detectable range thus around 100nm.]	Red
UCAV-N	Payload	EO/IR	The UCAV-N EO/IR sensor shall be capable of accepting external cues and slewing to the appropriate location for supporting the identification of surface targets. The system shall provide image clips annotated with appropriate track numbers from external cue. The system shall support this function at XX nm beyond the threat envelope of an SA XX and SAN XX surface to air missiles which is XXX nm.	Red
UCAV-N	Payload	EO/IR	The EO/IR payload shall autonomously track a one meter square moving target at a range of 75 miles and maintain a search of the area within +/-20° of the target being tracked.	Red
HALE	Payload	EO/IR	The HALE EO-IR subsystem shall require minimum inputs and control by the payload operator and mission requirements shall be pre-programmable.	Yellow
HALE	Payload	EO/IR	The HALE UAV EO/IR imagery rate shall be programmable in real time through the payload controller interface. The system shall provide image quality through lossless compression techniques or onboard reduction of image size for areas of interest while maintaining a constant and assigned data rate.	Yellow
HALE	Payload	EO/IR	The HALE EO-IR sensor package shall be modular to the extent that a maintenance crew can remove or install it within a time line that facilitates all other mission preparations starting no earlier than 22 hours prior to launch.	Yellow
HALE	Payload	EO/IR	The HALE UAV EO/IR sensor shall be capable of generating external cues for all onboard sensors. In addition, the EO/IR sensor shall be capable of accepting cues (WGS-84 coordinates) from external sources and slewing to the target location.	Yellow

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
HALE	Payload	EO/IR	The HALE EO-IR payload shall have sufficient resolution (NIIRS X) for supporting detection, tracking and cueing of onboard and offboard sensors for surface combatants, surfaced submarines, and small commercial vessels in blue water and the littorals. The system resolution shall be supported at ranges of XX nm beyond the threat envelope of an SA XX and SAN XX surface to air missiles.	Yellow
HALE	Payload	EO/IR	The HALE EO-IR sensors, in concert with other payloads, shall have resolution sufficient at <i>x range</i> to identify surface and semi-submersable vessels and read hull numbers (<i>NIIRS=x</i>) on cargo ships in the undefended open-ocean and littoral environment. [Range = ?, probably set by # 36 above or defended area requirements. Further analysis required.]	Yellow
HALE	Payload	EO/IR	The HALE EO-IR sensor shall have sufficient resolution(NIIRS X) to support monitoring the activities of individuals on surface vessels at a range of 30 nm. [To monitor activity on deck, need enough grazing angle to obtain side view of vessel. Altitude = 10 nm (60K ft), range 30 nm, angle = approx 20 degrees.]	Yellow
HALE	Payload	EO/IR	The HALE EO-IR subsystem shall transfer imagery to a TCS in combination with a multi-mode radar and ESM payload at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time.	Yellow
Tactical 1	Payload	EO/IR	The Tactical Tier 1 EO/IR shall be able to execute an automatic search. The system shall be capable of coordinated automatic search in conjunction with AV search patterns and shall have auto track capabilities. The system also shall be capable of camera guide and shall be capable of target location accuracy within 10M at ranges of 6,000 ft. [Range to provide standoff from small arms.]	Yellow
Tactical 2	Payload	EO/IR	The Tactical Tier 2 EO-IR subsystem shall have optical and IR resolution sufficient to identify moving and stationary vehicles to the extent that vehicle type, friend/foe, and combatant/non-combatant status can be determined (vehicle type, markings) from a vehicle at ranges of 5 nm in an urban environment. [X nm equal to MANPAD range against Tactical Tier 2 class to allow surveillance outside of shoulder fired SAM and small arms.]	Yellow
Tactical 2	Payload	EO/IR	The Tactical Tier 2 EO-IR subsystem shall transmit imagery to a TCS in combination with all other onboard payloads at a rate not to excee 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than 1/X of the time. [Assumes 1 antenna on ship or on beach dedicated to the Tactical Tier 2 UAV. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of UAVs that must be supported in most stressing scenario needs further analysis.]	Yellow
Tactical 3	Payload	EO/IR	The Tactical Tier 3 EO-IR subsystem shall be modular and part of a reconfigurable payload suite including communication relay.	Yellow
Tactical 3	Payload	EO/IR	The Tactical Tier 3 EO-IR subsystem shall have optical and IR resolution sufficient to identify moving and stationary vehicles to the extent that vehicle type, friend/foe, and combatant/non-combatant status can be determined (vehicle type, markings) from a vehicle moving at 150 kts at ranges of XX nm in an urban environment. [Range should be sufficient to provide sanctuary from lower end mobile SAMs. Analysis required.]	Yellow
Tactical 3	Payload	EO/IR	The Tactical Tier 3 EO-IR subsystem shall transfer imagery to a TCS in combination with all other installed payloads at a combined maximum rate ot to exceed 45 MB/S. The data shall be moved to the TCS over al time shared data link available for not more than 1/3 of the time. [Assumes 1 antenna on ship or on beach dedicated to the Tactical Tier 2 UAV. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of UAVs that must be supported in most stressing scenario needs further analysis.]	Yellow
Tactical 3	Payload	EO/IR	The Tactical Tier 3 EO-IR subsystem shall support the mid course guidance updates for weapons launched against fixed and moving vehicles in an urban environment at ranges of XX nm for maximum vehicle speeds up to 60 mph with UAV speeds up to 150 knots. [Range should be sufficient to provide sanctuary from lower end mobile SAMs. Analysis required.]	Yellow

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
UCAV-N	Payload	EO/IR	The UCAV-N EO/IR subsystem shall require minimum inputs and control by the payload operator and mission requirements shall be pre-programmable.	Yellow
UCAV-N	Payload	EO/IR	The EO/IR system shall incorporate a means of determining the position of a target within 5 meters independent of radar operations.	Yellow
UCAV-N	Payload	EO/IR	The UCAV-N EO/IR sensor shall be capable of general surveillance and planning level imagery of urban areas and cities at the maximum altitude of the vehicle.	Yellow
UCAV-N	Payload	EO/IR	The UCAV-N EO-IR subsystem shall transfer imagery to a TCS in combination with all valid UCAV payload combinations at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time. [There can be as many as 12 UCAVs airborne at once. This is not a reasonable number to timeshare the one shipboard antenna or the one HALE relay package. The scenarios indicate that the UCAVs are only collecting imagery and other data over short periods of their flights. Here we make the assumption that the one third requirement is the same as the HALE UAV time share and that we will manage the 12 UCAVs data streams such that no single UAV requires more than one third and most require much less. Needs more description and analysis.]	Yellow
HALE	Payload	ESM	The HALE ESM subsystem shall include data reduction & processing capability and capability to fuse data with data from other sensors so as to minimize data reduction, processing and fusion by limited mission control system personnel.	Red
HALE	Payload	ESM	The HALE ESM system shall be capable of analyzing the received RF activities and formulating/forwarding area of interest alerts that exhibit concentrated RF signatures that may indicate large scale land force movement. The system shall be capable of generating cues, based on passive ranging techniques for onboard payloads (eg. EO/IR, Multimode radar), that include position (WGS 84) and area of uncertainty. The system sensitivity shall accommodate this requirement at 50 nm beyond the threat envelope for a SA XX surface to air missile.	Red
HALE	Payload	ESM	The HALE UAV ESM payload shall be capable of processing RF parametric data and estimating ID with confidence for reporting to the HALE communications controller. The determination of ID shall be based on an internal intelligence file that may be tailored for the region of interest.	Red
UCAV-N	Payload	ESM	The UCAV-N ESM system shall be capable of analyzing the received RF activities and formulating/forwarding area of interest alerts that exhibit concentrated RF signatures that may indicate large scale land force movement. The system shall be capable of generating cues, based on passive ranging techniques for onboard payloads (eg. EO/IR, Multimode radar), that include position (WGS 84) and area of uncertainty. The system sensitivity shall accommodate this requirement at 50 nm beyond the threat envelope for a SA XX surface to air missile.	Red
HALE	Payload	ESM	The HALE ESM subsystem shall require minimum inputs and control by the payload operator and mission requirements shall be pre-programmable.	Yellow
HALE	Payload	ESM	The HALE ESM system shall be capable of accepting external cues to support coordinated data collects that will accommodate precision geolocation of threat emitters.	Yellow
HALE	Payload	ESM	The HALE ESM subsystem shall be capable of collecting identifying emissions of surface and semi-submersible vessels in the undefended open-ocean and littoral environment at a range of x nm. [Range probably set by other explicitly defended requirements. Analysis required.]	Yellow
HALE	Payload	ESM	The HALE ESM subsystem shall detect and passive range ground based emitters within X minutes of initial detection. The system shall be capable of generating cues, for the onboard multi-mode radar at ranges of 50 nm beyond the threat envelope for a SA XX surface to air missile which is XXX nm. The cue shall consist of both WGS 84 position and area of uncertainty. The ESM shall also be capable of accepting external cues based upon: *ELNOT, time, LOB or sector of interest *Frequency, time, LOB or sector of interest and altering the scan strategy to facilitate threat acquisition.	Yellow

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
HALE	Payload	ESM	<p>The HALE ESM package shall have sufficient sensitivity to perform to the radar horizon of 300 nm at an operating altitude of 60,000 feet. Additionally, the system shall support the following:</p> <ul style="list-style-type: none"> *Azimuth Coverage: 360 degrees *Elevation Coverage +20 degrees, -40 degrees *Frequency Range: XX to XX GHZ *Frequency Accuracy: Sufficient to support resolution of ID ambiguities *Frequency Agility: Frequency agility shall be supported *PRI Range: X to XXXXX *PRI Accuracy: Sufficient to support resolution of ID ambiguities *Precision PRI: Shall be supported *Time of Arrival: Time tagged to X.XXX microsecond accuracy *Pulse Width Range: X.XXX to XXXX microseconds *Amplitude Accuracy: X.XX dbm *Direction of Arrival Accuracy: +/- degrees *Passive Ranging Accuracy: +/- degrees *Passive Ranging Bearing Accuracy: +/- degrees *Search Bandwidth: Variable *I-File Modes: Utilize Standard USN I-Files <p>[Range to allow providing ESM insight for main beam emitters beyond the range of SA XX threat to the HALE plus the max range of another SA XX site for an aircraft attacking the first site.]</p>	Yellow
HALE	Payload	ESM	The HALE ESM payload shall be modular and part of a configurable payload suite including a Multi-mode radar and EO-IR.	Yellow
HALE	Payload	ESM	The HALE ESM subsystem shall transfer data to a TCS in combination with a multi-mode radar and EO/IR payload at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time.	Yellow
HALE	Payload	ESM	The HALE ESM sensor package shall be modular to the extent that a maintenance crew can remove or install it within a time line that facilitates all other mission preparations starting no earlier than 22 hours prior to launch.	Yellow
Tactical 3	Payload	ESM	The Tactical Tier 3 ESM subsystem shall transfer data to the TCS in combination with the EO/IR payload at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than 1/X of the time. [Assumes 1 antenna on ship or on beach dedicated to the Tactical Tier 2 UAV. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of UAVs that must be supported in most stressing scenario needs further analysis.]	Yellow
UCAV-N	Payload	ESM	The UCAV-N ESM subsystem shall require minimum inputs and control by the payload operator and mission requirements shall be pre-programmable.	Yellow
UCAV-N	Payload	ESM	The UCAV-N ESM subsystem shall transfer data to a TCS in combination with all valid payload mixtures at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time. [There can be as many as 12 UCAVs airborne at once. This is not a reasonable number to timeshare the one shipboard antenna or the one HALE relay package. The scenarios indicate that the UCAVs are only collecting imagery and other data over short periods of their flights. Here we make the assumption that the one third requirement is the same as the HALE UAV time share and that we will manage the 12 UCAVs data streams such that no single UAV requires more than one third and most require much less. Needs more description and analysis.]	Yellow
UCAV-N	Payload	ESM	The UCAV-N ESM payload shall be capable of passive tracking on line of bearing. The system shall provide geolocation to within X nm CEP within X minutes. The system shall provide external cues to both onboard and offboard sensors and weapons. The ESM payload shall be capable of coordinated (timed) data collects for specific emitters based on external cues. The ESM payload shall be capable of accepting external cues based on: Frequency time (Frequency, time, LOB or sector of interest) and altering the scan strategy to facilitate threat acquisition.	Yellow
HALE	Payload	IRST	The HALE UAV IRST system shall provide classification on 20 TBMs within the optical line of sight in a defined threat sector of 180 degrees.	Red

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
HALE	Payload	IRST	The HALE UAV IRST shall be capable of classification of the threat based upon parameters that may include boost characteristics, IR signature, kinematics, etc.	Red
HALE	Payload	IRST	The HALE IRST system shall collect and send to ground station IR data in conjunction with multiple HALE vehicles to enable fused 3D targeting quality TBM tracks at theater-wide ranges.	Red
HALE	Payload	IRST	The HALE UAV IRST shall be capable of coordinated data collects to support 3 D target quality tracking based upon multiple angle/angle solutions. The request for data collect will be assigned from an offboard source and will include: *Line of bearing from ownship *Update rate required *Start required upon notification *End request (return to search)	Red
HALE	Payload	IRST	The HALE UAV IRST shall be capable of generating both launch and splash point estimates in WGS 84 coordinates. The launch point estimate CEP shall be less than X nm. The impact point estimate CEP shall be less than X nm. In addition to the launch and splash point estimates, an error estimate shall be provided to cue onboard and offboard multi-mode radars for time critical targeting. The timing for producing these estimates starts at initial confirmed track and shall be updated continuously over the timeframe that the target is held in track. The system shall be capable of accepting cues from onboard and offboard sources base on LOB and time. [CEPs to be developed in conjunction with NTW office. If not, based upon time to search the CEP contained area with SAR in under 10 minute TEL pack-up-n-skoot time. Follow-up required.]	Red
HALE	Payload	IRST	The HALE UAV IRST shall be part of a modular payload including:Multi-mode radar, EO-IR, SIGINT including ELINT & COMINT, IRST	Red
HALE	Payload	IRST	The system shall be capable of tracking 20 TBMs within the optical line of sight in a defined threat sector of 180 degrees with a revisit time of less than 4 seconds.	Red
HALE	Payload	IRST	The HALE UAV IRST payload shall be capable of detecting and tracking in az/el, all TBMs to the optical line of sight of the system based upon a 60,000 feet sensor altitude during the boost phase of the missile.	Yellow
HALE	Payload	IRST	The HALE UAV IRST payload shall produce XX nanosecond latency az/el air track data for all targets within a selectable 180 degree field of view with the following attributes: *Sub milliradian absolute accuracy azimuth and elevation lines of bearing relative to host vehicle *Covariance data associated with the line of bearing estimate *XX nanosecond accuracy time tag for each measurement [Latency and accuracy requires discussion with NTW office.]	Yellow
HALE	Payload	IRST	The HALE UAV IRST shall be capable of reporting the classification of TBMs in conjunction with the air track, error estimates and launch/splash point calculations.	Yellow
UCAV-N	Payload	Laser Designator	The UCAV-N laser designator shall be provide guidance to laser guided weapons while attacking moving enemy land vehicles from the maximum altitude of the vehicle..	Red
UCAV-N	Payload	Laser Designator	The UCAV-N laser designator shall be provide terminal homing to laser guided weapons while attacking moving enemy land vehicles from the maximum altitude of the vehicle..	Red
UCAV-N	Payload	Laser Designator	The UCAV-N Laser Designator system shall be semi-autonomous to the extent that the attention and intervention of a crew's two payload operators can be shared with other payloads on the same and other air vehicles.	Yellow
UCAV-N	Payload	Laser Designator	The laser designator payload shall be modular and configurable with combinations of the other UCAV-N payloads. It shall be serviceable and removable without impacting the integration of other payload packages.	Yellow
HALE	Payload	MMR	The HALE MMR sensors shall be capable of detecting surfaced periscopes in open seas at a range of x nm. [Range performance will probably be driven by defended target requirements such as mines. Analysis required.]	Red

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
HALE	Payload	MMR	The HALE MMR subsystem shall include processing capability and capability to fuse radar data with data from other sensors so as to minimize ground station data reduction, processing and fusion by limited mission control system personnel.	Red
HALE	Payload	MMR	<p>The multi-mode radar (MMR) shall perform the following functions:</p> <p>AIR TO SURFACE</p> <ul style="list-style-type: none"> *Synthetic Aperture Radar with a maximum resolution of X.XX m -Spot Map -Strip Map **Inverse Synthetic Aperture Radar *GMTI *MTIm *Sea Surface Search *Periscope Detection <p>AIR TO AIR</p> <ul style="list-style-type: none"> *Volume Search *Sector Search <p>The MMR shall be able to operate all modes beyond a minimum range of 50 nm beyond the range of SA XX or SAN XX surface to air missiles or a total of XXX nm at an operating altitude of 60,000 feet.</p> <p>[Range sufficient to provide insight at 50 nm beyond the battle line assuming we can control SAM activity inside our own lines.]</p>	Red
HALE	Payload	MMR	<p>The HALE MMR shall perform the following functions as part of the identification of fixed or mobile TBM launchers:</p> <ul style="list-style-type: none"> *Accept cues from IRST or external sources and generate interval strip or spot map (based on error estimate for launch point). *Automatically form area of interest for area surrounding launch point estimate. *Track moving target inside AOI with track continuity of XX%. *X m MTIm with identification tags for assessed tracks. *Cueing of all other onboard sensors. <p>All of these functions shall be performed at a range greater than SA XX surface to air missile range or a total of XXX nm.</p>	Red
HALE	Payload	MMR	The HALE MMR sensors shall be capable of surveillance, detection and tracking of floating mines with an RCS of X dbsm in open seas or in a littoral environment at a range greater than SA XX surface to air missile range or a total of XXX nm. [Allows working mines on defended coastlines. RCS of a floating mine is unknown. Analysis required.]	Red
UCAV-N	Payload	MMR	The MMR shall accept cueing from offboard sensors to acquire a target of interest and provide ISAR images of the target of sufficient quality to enable identifying targets at least 3 meters long and .5 meter high (small boat) operating within 100 meters of shore. [The range based upon 50 nm beyond the maximum range of SA XX or SAN XX against UCAV-N to allow it to function as a gap fill land surveillance system.]	Red
UCAV-N	Payload	MMR	The UCAV-N MMR shall be capable of identifying 10 dbsm moving targets on/off roads at a range of greater than XXX nm and a minimum discernable velocity of 4 kts. [The range based upon 50 nm beyond the maximum range of SA XX or SAN XX against UCAV-N to allow it to function as a gap fill land surveillance system.]	Red
UCAV-N	Payload	MMR	The UCAV-N UAV Multi-Mode Radar shall be capable of identifying fixed and moving mobile TBM launchers with an RCS of 10 dbsm at ranges of XXX nm. [The range based upon 50 nm beyond the maximum range of SA XX or SAN XX against UCAV-N to allow it to function as a gap fill land surveillance system.]	Red

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
UCAV-N	Payload	MMR	The UCAV-N multi-mode radar shall be equipped with several automated modes to support the minimal interaction of the TCS mission commander. The system shall support: 1) Air to Air Mode, 2) Air to Surface Mode (Emphasis on land attack, SEAD, etc), 3) Air to Surface Mode (Emphasis on surface warfare), 4) Transit (Situational Awareness), 5) Air to Surface Synthetic Aperture Radar (Strip Map and Spot Map), 6) Inverse Synthetic Aperture Radar, 7) GMTI, 8) Surface Search, 9) Air to Air Wide Area Search AMTI and Sector Search AMTI. The MMR shall be able to operate all modes beyond a minimum range of XXX NM. [The range based upon 50 nm beyond the maximum range of SA XX or SAN XX against UCAV-N to allow it to function as a gap fill land surveillance system.]	Red
HALE	Payload	MMR	The HALE MMR subsystem shall require minimum inputs and control by the payload operator and mission requirements shall be pre-programmable.	Yellow
HALE	Payload	MMR	The HALE Multi-Mode Radar shall be modular to the extent that a maintenance crew can remove or install it within a timeline that facilitates all other mission preparations starting no earlier than 22 hours prior to launch.	Yellow
HALE	Payload	MMR	The HALE UAV Multi-Mode Radar shall have automated modes to facilitate the following functions: *Transit *Air to land surface with interleaved air to air for platform situational awareness *Air to sea surface with interlerleaved air to air for platform situational awareness. In addition, the system shall be compable of receiving real time radar mission planning updates prior to launch or in flight.	Yellow
HALE	Payload	MMR	The HALE MMR sensors shall be capable of detecting air surveillance, air defense, command and control sites, anti-ship cruise missile sites and stationary fighter sized aircraft at a range greater than SA XX surface to air missile range or a total of XXX nm. [Allows collection of pre-attack imagery for targets defended by SAM sites.]	Yellow
HALE	Payload	MMR	The HALE MMR shall report all classification/identification decisions with confidence to the communication system for dissemination through the data link architecture. The MMR shall accept cues from offboard sources and shall provide the classification and identities associated with these cues. The system shall correllate and tag any MMR data with offboard track data to facilitate offboard ID decisions. [Range will be probably be driven by defended target requirements. Analysis required.]	Yellow
HALE	Payload	MMR	The HALE UAV MMR shall generate internal cues, based upon surface search mode data, for the generation of high resolution spot map and/or ISAR to facilitate the identification process at at a range greater than SAN XX or SA XX surface to air missile range or a total of XXX nm. The resolution of the SAR imagery shall be X meters.	Yellow
HALE	Payload	MMR	The HALE UAV MMR shall generate spot and strip map imagery of resolution of at least X meters to facilitate BDA of runways and aircraft beyond the threat envelope of an SA XX surface to air missile or a total of XXX nm.	Yellow
HALE	Payload	MMR	The HALE MMR shall have automated modes capable of identifying surfaced submarines in the littoral environment at a range greater than SAN XX or SA XX surface to air missile range or a total of XXX nm.	Yellow
HALE	Payload	MMR	The HALE MMR shall have resolution capable of identifying surface combatants, surfaced submarines, cargo vessels and coastal vessels in the littoral environment at a range greater than SAN XX or SA XX surface to air missile range or a total of XXX nm.	Yellow
HALE	Payload	MMR	The HALE UAV Multi-Mode Radar shall be part of a modular payload including:Multi-mode radar, EO-IR, SIGINT including ELINT & COMINT, Communication Relay	Yellow
HALE	Payload	MMR	The HALE Multi-Mode Radar shall transfer data to a TCS in combination with an EO/IR and ESM payload at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time.	Yellow

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
HALE	Payload	MMR	The HALE UAV Multi-Mode Radar shall provide the location of moving automobiles with a minimum discernable velocity of 4 kts and an RCS of 10 dbsm, at a range greater than 50 nm beyond the range of SA XX surface to air missiles or a total of XXX nm and with sufficient accuracy to provide a single image cue to the EO/IR sensor.	Yellow
HALE	Payload	MMR	The HALE MMR shall be capable of tracking 10 dbsm moving targets on/off roads at a range greater than 50 nm beyond the range of SA XX surface to air missiles or a total of XXX nm and a minimum discernable velocity of 4 kts.	Yellow
Tactical 3	Payload	MMR	The Tactical Tier 3 multi-mode radar subsystem shall transfer data to the TCS in combination with all valid payload combinations at a combined maximum rate not to exceed 45 Mbps. The data shall be moved to the TCS over a time shared data link available for not more than 1/3 of the time. [Assumes 1 antenna on ship or on beach dedicated to the Tactical Tier 2 UAV. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of UAVs that must be supported in most stressing scenario needs further analysis.]	Yellow
UCAV-N	Payload	MMR	The UCAV-N MMR payload shall be semi-autonomous to the extent that the attention and intervention of a crew's two payload operators can be shared with other payloads on the same and other air vehicles.	Yellow
UCAV-N	Payload	MMR	The MMR shall accept cueing from offboard sensors to acquire a target of interest and provide ISAR images of the target of sufficient quality to enable identifying targets at least 3 meters long and .5 meter high (small boat) operating within 100 meters of shore. [The range based upon 50 nm beyond the maximum range of SA XX or SAN XX against UCAV-N to allow it to function as a gap fill land surveillance system.]	Yellow
UCAV-N	Payload	MMR	The UCAV-N UAV Multi-Mode Radar shall be capable of detecting and tracking fixed and moving mobile TBM launchers with an RCS of 10 dbsm at ranges of XXX nm.[The range based upon 50 nm beyond the maximum range of SA XX or SAN XX against UCAV-N to allow it to function as a gap fill land surveillance system.]	Yellow
UCAV-N	Payload	MMR	The payload operator shall be provided with GMTI, plus SAR and MTIm images at a resolution and accuracy sufficient to prosecute fixed and moving TBM launchers from a range of at least XXX nm. [The range based upon 50 nm beyond the maximum range of SA XX or SAN XX against UCAV-N to allow it to function as a gap fill land surveillance system.]	Yellow
UCAV-N	Payload	MMR	The UCAV-N MMR shall have automated modes cap able of identifying surfaced submarines in the littoral environment at a range of xx nm. [The range based upon 50 nm beyond the maximum range of SA XX or SAN XX against UCAV-N to allow it to function as a gap fill land surveillance system.]	Yellow
UCAV-N	Payload	MMR	The UCAV-N MMR shall have resolution capable of identifying surface combatants, surfaced submarines, cargo vessels and coastal vessels in the littoral environment at a range of x nm. [The range based upon 50 nm beyond the maximum range of SA XX or SAN XX against UCAV-N to allow it to function as a gap fill land surveillance system.]	Yellow
UCAV-N	Payload	MMR	The UCAV-N multi-mode radar shall have an ISAR mode capable of identifying patrol boats in the littoral environment while the aircraft is flying at its maximum altitude.	Yellow
UCAV-N	Payload	MMR	The UCAV-N multi-mode radar subsystem shall transfer imagery to a TCS in combination with all valid UCAV payload combinations at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time. [There can be as many as 12 UCAVs airborne at once. This is not a reasonable number to timeshare the one shipboard antenna or the one HALE relay package. The scenarios indicate that the UCAVs are only collecting imagery and other data over short periods of their flights. Here we make the assumption that the one third requirement is the same as the HALE UAV time share and that we will manage the 12 UCAVs data streams such that no single UAV requires more than one third and most require much less. Needs more description and analysis.]	Yellow

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
UCAV-N	Payload	MMR	The UCAV-N MMR shall be capable of tracking 10 dbsm moving targets on/off roads at a range of greater than XXX nm and a minimum discernable velocity of 4 kts.[The range based upon 50 nm beyond the maximum range of SA XX or SAN XX against UCAV-N to allow it to function as a gap fill land surveillance system.]	Yellow
UCAV-N	Payload	NBC	The UCAV-N NBC detection system shall be capable of detecting agents at all altitudes while the aircraft is operating at its maximum altitude.	Red
UCAV-N	Payload	NBC	The UCAV-N NBC Detection payload shall be semi-autonomous to the extent that the attention and intervention of a crew's two payload operators can be shared with other payloads on the same and other air vehicles.	Yellow
UCAV-N	Payload	NBC	The NBC detection system shall provide transfer data to the TCS in combination with all other payloads at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a single time shared data link available for not more than one third of the time. [There can be as many as 12 UCAVs airborne at once. This is not a reasonable number to timeshare the one shipboard antenna or the one HALE relay package. The scenarios indicate that the UCAVs are only collecting imagery and other data over short periods of their flights. Here we make the assumption that the one third requirement is the same as the HALE UAV time share and that we will manage the 12 UCAVs data streams such that no single UAV requires more than one third and most require much less. Needs more description and analysis.]	Yellow
UCAV-N	Payload	NBC	The UCAV-N NBC detection payload shall be modular and configurable with combinations of the other UCAV-N payloads. It shall be serviceable and removable without impacting the integration of other payload packages.	Yellow
UCAV-N	Payload	NBC	The NBC Detection System shall be comprised of remote and contact sensors and the equipment needed to identify the agent detected and transmit detection data to the system bus for transmission to the operator through any available datalink.	Yellow
HALE	Payload	Plug and Play	The HALE Comm Relay package shall be modular to the extent that a maintenance crew can remove or install it within a timeline that facilitates all other mission preparations starting no earlier than 22 hours prior to launch.	Red
HALE	Payload	Plug and Play	The HALE Comm. Relay Package shall be modular and part of a complete payload including:Multi-mode radar, EO-IR, SIGINT including ELINT & COMINT, Communication Relay.	Red
HALE	Payload	Plug and Play	The HALE UAV EO/IR shall be part of a modular payload including: Multi-mode radar, EO-IR, SIGINT including ELINT & COMINT, Communication Relay	Red
HALE	Payload	Plug and Play	The HALE UAV IRST shall be part of a modular payload including:Multi-mode radar, EO-IR, SIGINT including ELINT & COMINT, IRST	Red
Tactical 3	Payload	Plug and Play	The Tactical Tier 3 Communications Relay subsystem shall be modular and part of a reconfigurable payload including EO/IR.	Red
HALE	Payload	Plug and Play	The HALE EO-IR sensor package shall be modular to the extent that a maintenance crew can remove or install it within a time line that facilitates all other mission preparations starting no earlier than 22 hours prior to launch.	Yellow
HALE	Payload	Plug and Play	The HALE EO-IR subsystem shall transfer imagery to a TCS in combination with a multi-mode radar and ESM payload at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time.	Yellow
HALE	Payload	Plug and Play	The HALE ESM payload shall be modular and part of a configurable payload suite including a Multi-mode radar and EO-IR.	Yellow
HALE	Payload	Plug and Play	The HALE ESM subsystem shall transfer data to a TCS in combination with a multi-mode radar and EO/IR payload at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time.	Yellow
HALE	Payload	Plug and Play	The HALE Multi-Mode Radar shall be modular to the extent that a maintenance crew can remove or install it within a timeline that facilitates all other mission preparations starting no earlier than 22 hours prior to launch.	Yellow
HALE	Payload	Plug and Play	The HALE Multi-Mode Radar package shall be modular and part of a configurable payload suite including an EO/IR and ESM payload.	Yellow

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
HALE	Payload	Plug and Play	The HALE Multi-Mode Radar shall transfer data to a TCS in combination with an EO/IR and ESM payload at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time.	Yellow
HALE	Payload	Plug and Play	The HALE Survivability package shall be modular to the extent that a maintenance crew can remove or install it within a timeline that facilitates all other mission preparation operations starting no earlier than 22 hours prior to launch.	Yellow
HALE	Payload	Plug and Play	The HALE Vehicle airframe and systems shall allow the reconfiguration of any of the valid modular payload combinations within a timeframe that facilitates all other mission preparation operations starting no earlier than 22 hours prior to launch. [Facilitates 24 hour turn around. Thus a vehicle will not miss a rotation on station. Any time over this and another vehicle will be required to prevent a break in orbit service.]	Yellow
HALE	Payload	Plug and Play	The HALE Vehicle shall support of the following payloads: *Multi-mode radar / EO-IR / Tactical ESM *SIGINT including ELINT & COMINT / Communication Relay *Multi-Mode Radar / IRST	Yellow
HALE	Payload	Plug and Play	The HALE ESM sensor package shall be modular to the extent that a maintenance crew can remove or install it within a time line that facilitates all other mission preparations starting no earlier than 22 hours prior to launch.	Yellow
Tactical 2	Payload	Plug and Play	The Tactical Tier 2 ESM subsystem shall transmit imagery to a TCS in combination with all other onboard payloads at a rate not to excee 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than 1/X of the time. [Assumes 1 antenna on ship or on beach dedicated to the Tactical Tier 2 UAV. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of Tactical Tier 2's that must be supported in most stressing scenario needs further analysis.]	Yellow
Tactical 3	Payload	Plug and Play	The Tactical Tier 3 EO-IR subsystem shall be modular and part of a reconfigurable payload suite including communication relay.	Yellow
Tactical 3	Payload	Plug and Play	The Tactical Tier 3 EO-IR subsystem shall transfer imagery to a TCS in combination with all other installed payloads at a combined maximum rate ot to exceed 45 MB/S. The data shall be moved to the TCS over al time shared data link available for not more than 1/3 of the time. [Assumes 1 antenna on ship or on beach dedicated to the Tactical Tier 2 UAV. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of UAVs that must be supported in most stressing scenario needs further analysis.]	Yellow
Tactical 3	Payload	Plug and Play	The Tactical Tier 3 ESM subsystem shall transfer data to the TCS in combination with the EO/IR payload at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than 1/X of the time. [Assumes 1 antenna on ship or on beach dedicated to the Tactical Tier 2 UAV. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of UAVs that must be supported in most stressing scenario needs further analysis.]	Yellow
Tactical 3	Payload	Plug and Play	The Tactical Tier 3 multi-mode radar subsystem shall transfer data to the TCS in combination with all valid payload combinations at a combined maximum rate not to exceed 45 Mbps. The data shall be moved to the TCS over a time shared data link available for not more than 1/3 of the time. [Assumes 1 antenna on ship or on beach dedicated to the Tactical Tier 2 UAV. Duplex 45 MB/S in new CDL update. Duplex allows for future use of IP type implementations. Assume we want to preserve this ability for future. With one antenna must time share. Number of UAVs that must be supported in most stressing scenario needs further analysis.]	Yellow

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
UCAV-N	Payload	Plug and Play	The UCAV-N EO-IR subsystem shall transfer imagery to a TCS in combination with all valid UCAV payload combinations at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time. [There can be as many as 12 UCAVs airborne at once. This is not a reasonable number to timeshare the one shipboard antenna or the one HALE relay package. The scenarios indicate that the UCAVs are only collecting imagery and other data over short periods of their flights. Here we make the assumption that the one third requirement is the same as the HALE UAV time share and that we will manage the 12 UCAVs data streams such that no single UAV requires more than one third and most require much less. Needs more description and analysis.]	Yellow
UCAV-N	Payload	Plug and Play	The UCAV-N ESM subsystem shall transfer data to a TCS in combination with all valid payload mixtures at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time. [There can be as many as 12 UCAVs airborne at once. This is not a reasonable number to timeshare the one shipboard antenna or the one HALE relay package. The scenarios indicate that the UCAVs are only collecting imagery and other data over short periods of their flights. Here we make the assumption that the one third requirement is the same as the HALE UAV time share and that we will manage the 12 UCAVs data streams such that no single UAV requires more than one third and most require much less. Needs more description and analysis.]	Yellow
UCAV-N	Payload	Plug and Play	The laser designator payload shall be modular and configurable with combinations of the other UCAV-N payloads. It shall be serviceable and removable without impacting the integration of other payload packages.	Yellow
UCAV-N	Payload	Plug and Play	The UCAV-N multi-mode radar subsystem shall transfer imagery to a TCS in combination with all valid UCAV payload combinations at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a time shared data link available for not more than one third of the time. [There can be as many as 12 UCAVs airborne at once. This is not a reasonable number to timeshare the one shipboard antenna or the one HALE relay package. The scenarios indicate that the UCAVs are only collecting imagery and other data over short periods of their flights. Here we make the assumption that the one third requirement is the same as the HALE UAV time share and that we will manage the 12 UCAVs data streams such that no single UAV requires more than one third and most require much less. Needs more description and analysis.]	Yellow
UCAV-N	Payload	Plug and Play	The NBC detection system shall provide transfer data to the TCS in combination with all other payloads at a combined maximum rate not to exceed 45 MB/S. The data shall be moved to the TCS over a single time shared data link available for not more than one third of the time. [There can be as many as 12 UCAVs airborne at once. This is not a reasonable number to timeshare the one shipboard antenna or the one HALE relay package. The scenarios indicate that the UCAVs are only collecting imagery and other data over short periods of their flights. Here we make the assumption that the one third requirement is the same as the HALE UAV time share and that we will manage the 12 UCAVs data streams such that no single UAV requires more than one third and most require much less. Needs more description and analysis.]	Yellow
UCAV-N	Payload	Plug and Play	The UCAV-N NBC detection payload shall be modular and configurable with combinations of the other UCAV-N payloads. It shall be serviceable and removable without impacting the integration of other payload packages.	Yellow
UCAV-N	Payload	Plug and Play	The UCAV-N shall facilitate a complete payload swap from and to any valid combination of payloads in less than 1.5 hours.	Yellow
UCAV-N	Payload	Plug and Play	The UCAV-N shall be capable of carrying the following payloads in multiple combinations: Laser designator, EO/IR Sensor, NBC sensor, Anti-Radiation Missiles, Small Diameter Bomb (SDB) Precision Guided Munitions (PGMs), Laser Guided Bombs (LGBs)	Yellow
UCAV-N	Payload	Plug and Play	The UCAV-N weapons shall be useable in combination with other payloads. They shall be serviceable, installable and removable without impacting the integration of other payload packages.	Yellow

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
HALE	Payload	Survivability Subsystem	The HALE UAV survivability package shall require minimal inputs and control by the payload operators and mission requirements shall be pre-programmable.	Yellow
HALE	Payload	Survivability Subsystem	The HALE Survivability package shall be modular to the extent that a maintenance crew can remove or install it within a timeline that facilitates all other mission preparation operations starting no earlier than 22 hours prior to launch.	Yellow
UCAV-N	Payload	Survivability Subsystem	The UCAV-N Survivability payload shall be semi-autonomous to the extent that the attention and intervention of a crew's two payload operators can be shared with other payloads on the same and other air vehicles.	Yellow
Tactical 3	Payload	Weapons	The Tactical Tier 3 UAV shall support the launch of AGM 114 Hellfire weapons. [Like ID 25, if the user requirement is to carry a 'smart bomb' not just hellfire	Yellow
UCAV-N	Payload	Weapons	The UCAV-N shall be capable of attacking both stationary and mobile TBM launchers using HALE surveillance and targeting information	Yellow
UCAV-N	Payload	Weapons	The UCAV-N shall be capable of attacking surface combatants, cargo ships and coastal craft in the littoral environment using HALE surveillance and targeting information	Yellow
UCAV-N	Payload	Weapons	The UCAV-N Weapons System payload shall be semi-autonomous to the extent that the attention and intervention of a crew's two payload operators can be shared with other payloads on the same and other air vehicles.	Yellow
UCAV-N	Payload	Weapons	The UCAV-N Weapons subsystem shall include the capability to detonate Anti-Radiation Missiles, Small diameter Bombs(SDB's), Precision Guided Munitions (PGM's) and Laser Guided Bombs (LGB's) launched from the UCAV-N.	Yellow
UCAV-N	Payload	Weapons	The UCAV-N Weapons subsystem shall include the capability to provide mid course guidance commands to Anti-Radiation Missiles and Laser Guided Bombs released from the air vehicle.	Yellow
UCAV-N	Payload	Weapons	The UCAV-N weapons shall be useable in combination with other payloads. They shall be serviceable, installable and removable without impacting the integration of other payload packages.	Yellow
UCAV-N	Payload	Weapons	The UCAV-N Weapons subsystem shall include the capability to provide terminal homing commands to Anti-Radiation Missiles launched from the UCAV-N.	Yellow
UCAV-N	Payload	Weapons	The UCAV-N Weapons subsystem shall include the capability to select fuse detonation commands for to Anti-Radiation Missiles, Small diameter Bombs(SDB's), Precision Guided Munitions (PGM's) and Laser Guided Bombs (LGB's) launched from the UCAV-N.	Yellow
UCAV-N	Payload	Weapons	The UCAV-N Weapons subsystem shall accomodate weapons acquisition for anti-radiation Missiles and Laser Guided Bombss released from the air vehicle.	Yellow
TCS	Payload Product Management		The TCS shall have the capability to display surveillance, detection and tracking imagery and annotation of fixed and moving targets over theater wide ranges (<i>defined as...?</i>)	Yellow
TCS	Payload Product Management		The TCS shall have the capability to display and simultaneously relay to all other TCS in theater NBC detection data from selected NBC payloads.	Yellow
TCS	Payload Product Management		The TCS operator shall be able to select the content (i.e., - AV heading/altitude, airspeed, geographical position, etc.) of the overlay information [SPS332].	Yellow
TCS	Payload Product Management		The TCS shall be capable of identifying targets detected by the UAV.	Yellow
TCS	Payload Product Management		The TCS shall support the targeting of multiple objects by a UCAV-N.	Yellow
TCS	Payload Product Management		The TCS shall include the capability to provide mid course guidance commands to the UAV weapons systems for select weapons released from the air vehicle.	Yellow
TCS	Payload Product Management		The TCS be capable of directing UCAV-N attacks on fixed and moving targets using HALE surveillance and targetting.	Yellow
TCS	Payload Product Management		TCS shall provide the capability to receive and process products associated with SAR MMPs, including full motion imagery and mosaic [SPS327].	Yellow
TCS	Payload Product Management		The TCS shall be capable of recognizing, differentiating and assigning weapons based on data supplied by the Tactical Tier 3 UAV.	Yellow
TCS	Payload Product Management		The TCS shall incorporate target detection and classification algorithms compatible with IRST Detection Software	Yellow

System	Technology	Sub Technology	System Performance Requirement	Tech Maturity
TCS	Payload Product Management		The TCS shall incorporate a data base of all known targets to be used to compare UAV supplied data to to aide in target identification.	Yellow